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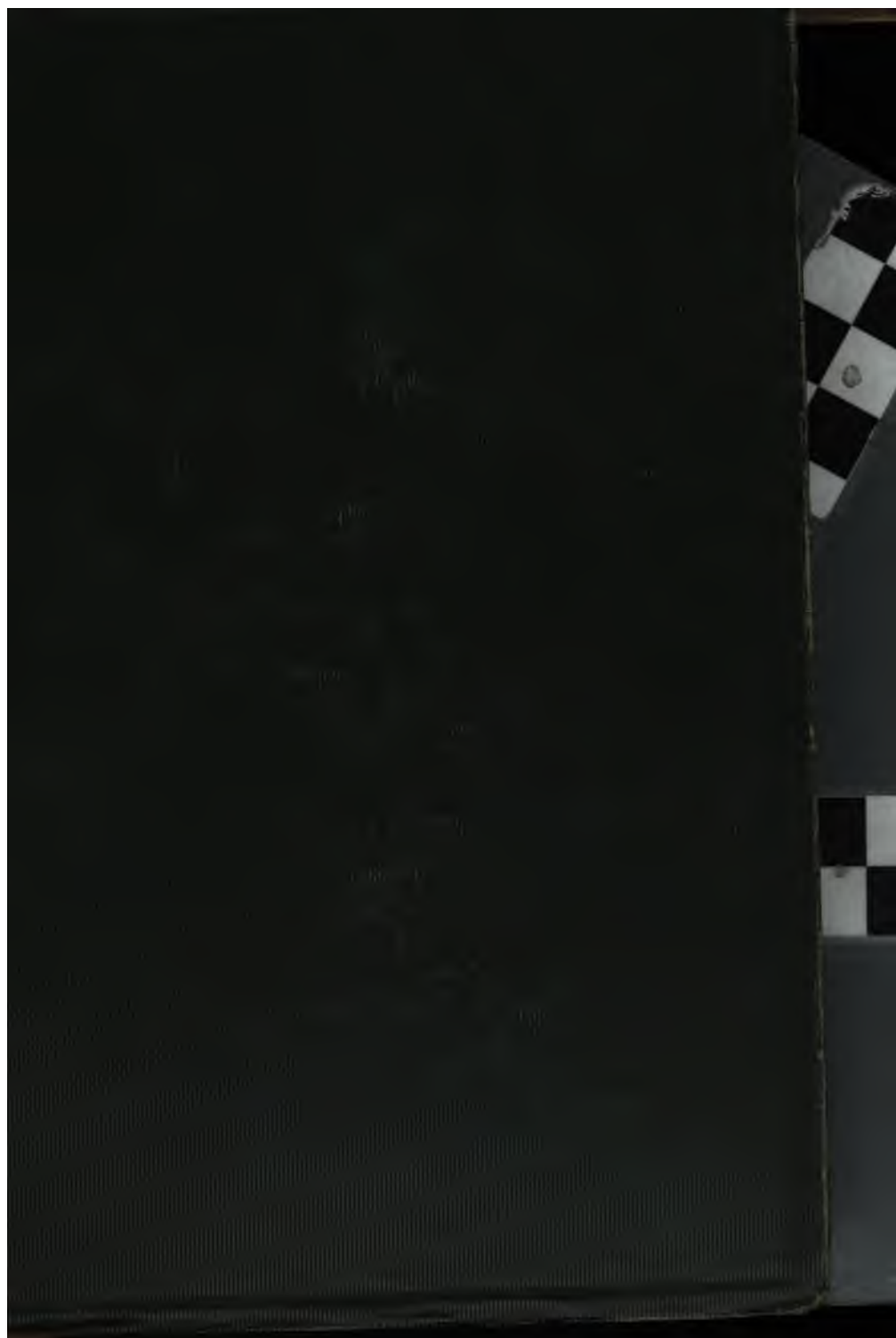
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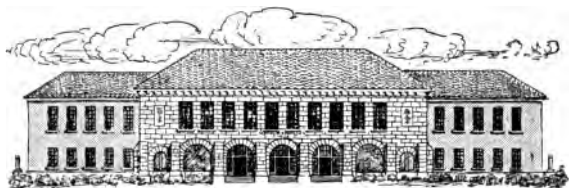
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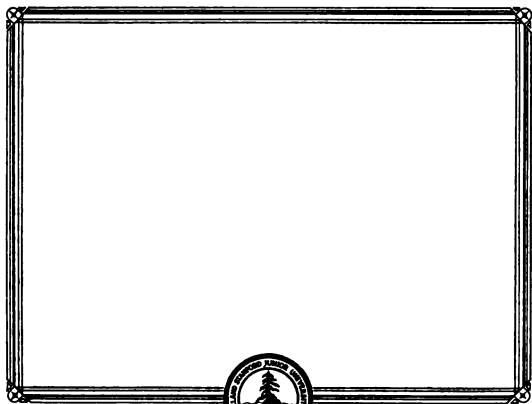
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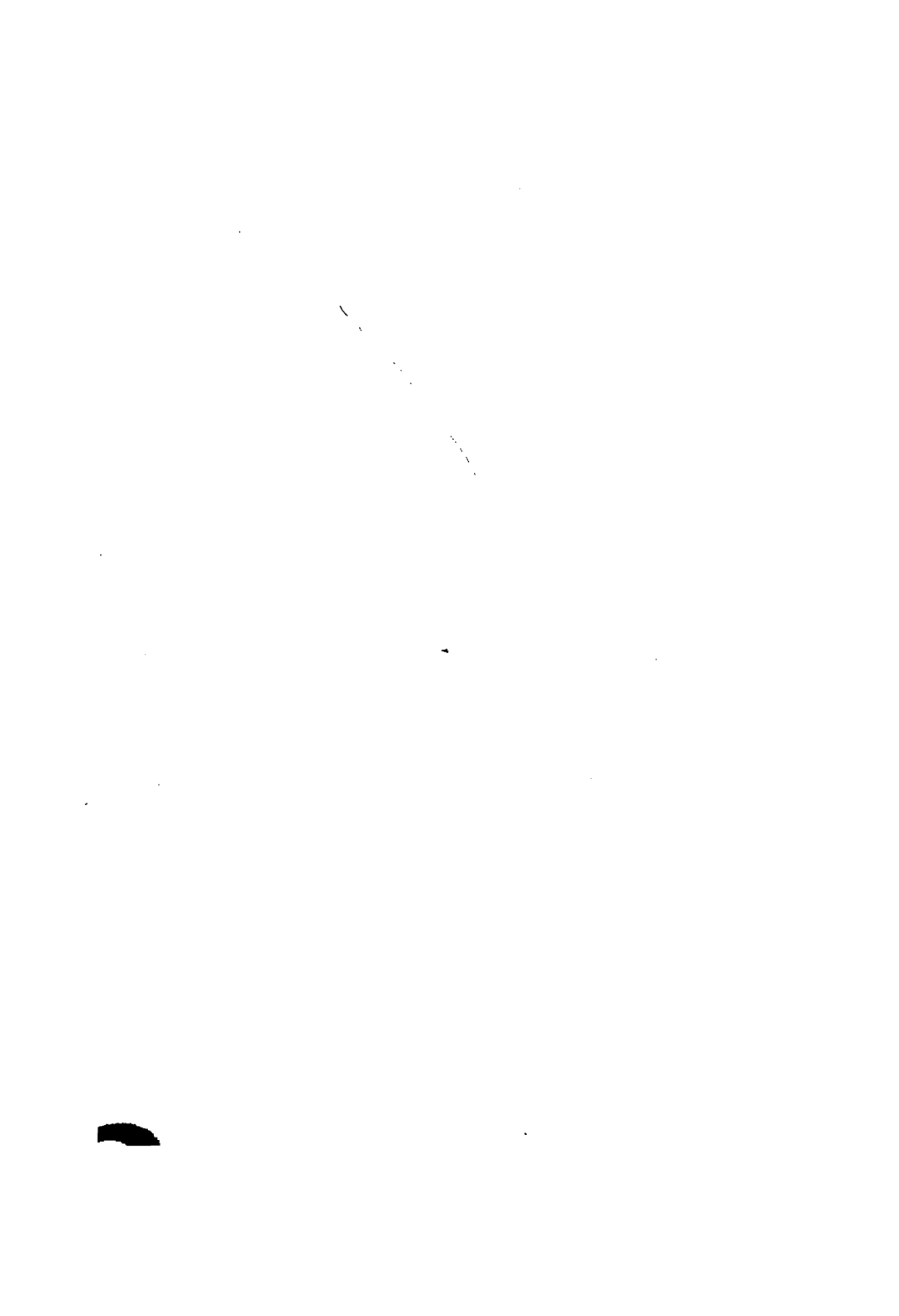


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FUNDAMENTALS OF CHILD STUDY





FUNDAMENTALS
OF
CHILD STUDY

A DISCUSSION OF
INSTINCTS AND OTHER FACTORS
IN HUMAN DEVELOPMENT

WITH
PRACTICAL APPLICATIONS

BY
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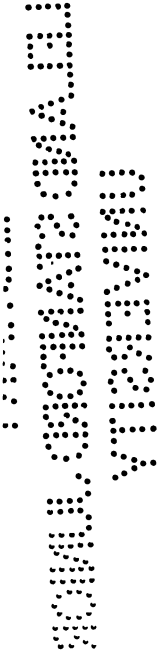
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Norwood, Mass., U.S.A.

To my lamented Friend

LOUIS H. GALBREATH

*whose generous and genial personality has gladdened
and ennobled many lives, and whose broad views,
stimulating presence, and suggestive conversations
have often inspired and directed my thought and
work as an individual and an educator*


This Book is Affectionately Dedicated

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C

vation, experiment, and discussion, so far as time will permit. To aid readers and students in assimilating and supplementing the text, exercises and references are given at the close of each chapter. In class work the recitation periods may well be taken up largely in discussions of these exercises and in reports of reading, though if preferred they may be ignored and the text alone studied and recited. It is hoped that the plan of the book will adapt itself to the use of intelligent parents and to classes in normal schools and universities, with varying preparation and amount of time to devote to the subject. Many parents will prefer to begin with chapter five and to omit chapter fourteen and perhaps some of the chapters that follow.

No attempt is made to give a complete bibliography, as there are already several good ones. A list of child study books for the benefit of those not familiar with the literature of the subject is given in the first of the book. Suggestions for reading will be found at the close of each chapter, and at the back of the book are given the full name of journals often referred to and an alphabetical list of all books named in the text. Since the references that will be most valuable in connection with each chapter depend upon what literature is accessible, the time that can be spent in reading, the maturity of the reader, and the phases of the subject which it is desired to emphasize, each teacher will, in part, wish to make his own reference list. A blank page is therefore left for this purpose.

Acknowledgments are due to many earnest students of children, especially to G. Stanley Hall, the father of all child study in America; to J. Mark Baldwin, who



has given us a theory of organic development; to Lloyd Morgan, who has described instincts and habits with such acuteness and clearness; and to Earl Barnes, who has so intelligently studied the effects of social influences upon children; also to Mr. J. F. Reigart and to my wife for assisting with the proofs, and to my friend Rev. W. F. Greenman for suggestions.

E. A. K.

FITCHBURG NORMAL SCHOOL,
July, 1903.

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CHILD STUDY LITERATURE

BOOKS TREATING OF THE FIRST THREE YEARS OF CHILDHOOD

Preyer: The Mind of the Child, 2 vols. ; Infant Mind, condensed from the above. Appleton.

Shinn: Biography of a Baby. Houghton, Mifflin & Co.

Moore: Mental Development of a Child. Macmillan.

Tracy: The Psychology of Childhood. D. C. Heath.

The first three books are each studies of individual children, while the last is a summary of various studies.

Perez: First Three Years of Childhood.

This is an older and less critical work.

BOOKS CONTAINING SYMPATHETIC OBSERVATIONS AND PRACTICAL SUGGESTIONS REGARDING YOUNG CHILDREN

Harrison: A Study of Child Nature. Chicago Kindergarten College.

Wiggin: Children's Rights. Houghton, Mifflin & Co.

Malleon: Early Training of Children. D. C. Heath.

Proudfoot: Mother's Ideals. The Author, Chicago, Auditorium.

Winterburn: From a Child's Standpoint, pp. 278, and Nursery Ethics, pp. 241. The Baker & Taylor Co., New York.

Du Bois: Beckoning of Little Hands, pp. 166, and The Point of Contact, pp. 88. John D. Wattles, Philadelphia.

Wiltse: Place of the Story in Early Education. Ginn & Co.

Chenery, Susan: As the Twig is Bent. Houghton, Mifflin & Co.

Gilman, C. P. (Stetson): Concerning Children. Small, Maynard & Co., Boston.

BOOKS RELATING CHIEFLY TO THE STUDY OF CHILDREN IN SCHOOL

Rowe: The Physical Child. Macmillan.

Groszmann: A Working System of Child Study for Schools. C. W. Bardeen, Syracuse, N. Y.

Warner: The Study of Children. Macmillan.

AUTOBIOGRAPHICAL AND LITERARY ACCOUNTS OF CHILDREN

- Aldrich**: Story of a Bad Boy. Houghton, Mifflin & Co.
Howells: A Boy's Town. Harpers.
White: Court of Boyville. Doubleday & McClure Co.
Warner: Being a Boy. Houghton, Mifflin & Co.
Burnett: The One I Knew Best of All. Houghton, Mifflin & Co.
Martin: Emmy Lou. McClure, Phillips & Co.
Loti: Romance of a Child. Rand, McNally & Co.
Phillips: Just About a Boy. Herbert S. Stone & Co., N. Y.
Laughlin: Johnnie. The Bowen Merrill Co., Kansas City.
Keller: Story of My Life. Doubleday, Page & Co.
Smith, W. H.: The Evolution of Dodd. Rand, McNally & Co.
Canton, W. V., Her Book and Various Verses, pp. 150. Stone & Kimball, N.Y.
Meynell, Alice: The Children, pp. 134. John Lane, N. Y., 1897.

BOOKS TREATING OF VARIOUS PHASES OF CHILD STUDY

- Baldwin**: Mental Development in the Child and the Race: Vol. I, Methods and Processes; Vol. II, Social and Ethical Interpretations; Vol. III, Organic Evolution and Development. Macmillan.
 Very valuable discussions of fundamental principles of organic and social development, but somewhat obscure and technical in places.
- Oppenheim**: The Development of the Child, pp. 296, and Mental Growth and Control, pp. 296. Macmillan.
 Both books are interesting and valuable, the first dealing more with the physical nature is directly in the line of the author's specialty, medicine.
- Judd**: Genetic Psychology. Appleton.
 A very clear and valuable study of the modification produced in mind by experience and habit.
- Compayre**: Intellectual and Moral Development of the Child: Part I, Early Infancy; Part II, Later Infancy. Appleton.
 A readable, psychological study of children.

Drummond: *The Child, His Nature and Nurture*. J. M. Dent & Co., London.

An excellent little book.

Sully: *Studies of Childhood*.

Especially valuable for its numerous illustrations of children's doings and sayings.

Barnes: *Studies in Education (Studies in Ed.)*, Vols. I and II, each consisting of a series of ten pamphlets describing the studies made by himself and assistants in England and America of the social ideas and ideals of children. The Author, Philadelphia.

Chamberlain: *The Child*. W. Scott, London.

A valuable summary of much of the literature of child study.

Stableton: *Diary of a Western Schoolmaster*. Ainsworth & Co., Chicago.

A very interesting account of the individual development of twenty adolescent boys who were somewhat exceptional in their characteristics.

Adler: *Moral Instruction of Children*. Appleton.

A valuable discussion of the general problem of moral instruction, with practical suggestions as to the teaching of various virtues.

Hogan, Louise E.: *A Study of a Child*. Harpers.

Not intended to be scientific or systematic; simply a mother's record of the first eight years of her boy, with comments.

Taylor: *The Child*. Appleton.

Contains elementary truths of psychology, child study, and pedagogy.

FUNDAMENTALS OF CHILD STUDY



CHAPTER I

NATURE, SCOPE, AND PROBLEMS OF CHILD STUDY

DIFFERENCE BETWEEN CHILDREN AND ADULTS

PHYSICALLY and mentally, children differ from adults in other ways besides the obvious ones of size and knowledge. Physically this is evident from the fact that we can form some idea of the age of a person represented in a picture or statue when there is nothing to show the scale upon which it was made. There must therefore be peculiarities of form and proportion of parts at different ages upon which we base our judgments. Most persons, however, who have not had their attention called to the matter, are unable to state in just what ways children and adults differ. Some even hesitate regarding the most obvious differences in relative size of head, body, and limbs, though the ratios are approximately as follows:—

Height of head of adult to that of an infant	. . . 2 : 1
Length of body of adult to that of an infant	. . . 3 : 1
Length of arm of adult to that of an infant	. . . 4 : 1
Length of leg of adult to that of an infant	. . . 5 : 1


These differences in proportion of parts are probably greater than exist between some adult animals and

adult human beings. They are only the more obvious of the many differences between children and adults, in proportion of parts, size of vital organs, and physiological processes such as those of circulation, respiration, and digestion.

Mentally, every one recognizes marked differences between the mind of a child and of an adult, though when questioned as to the exact character of these differences, most persons are even more hazy and indefinite in their answers than they are regarding bodily differences. Those who have given the subject most attention, however, are sure that the mental differences are greater than the physical, though they are less easily stated in exact terms.

ORIGIN OF CHILD STUDY

These truths have received much more attention recently than in former times, and the result has been increased interest in child life in the home, in the school, and in literature, art, and science. This increasing interest with the consequent discovery of additional differences between children and adults has led to the attempt to determine definitely and accurately the peculiarities of childhood at various stages, and thus we have the beginning of a new science—the science of Paidology or Child Study. If children were merely adults in miniature, there would be no occasion for such a science; but as we have seen, they differ radically from adults, hence a science of child study has arisen, quite distinct from the general sciences of physiology and psychology. Such a study is necessary to the completion of the circle of the sciences, and it is also



indispensable as a basis for the science of education and the art of teaching.

PERIOD COVERED BY CHILD STUDY

It is not easy to say when a boy or girl becomes a man or woman. Even in law there is variability; for a man is recognized as earlier mature or competent for certain purposes than he is for others, *e.g.* he can enter the army at eighteen and vote at twenty-one, but cannot hold the office of President till he is thirty-five. Again, the law recognizes the passing of the normal adult stage by providing for the retirement of officers after a certain age. Old age, as well as the period before maturity is reached, may therefore furnish a separate field for study.

Child study is properly concerned with all the changes that usually take place in human beings before they reach maturity. Most of these changes occur before the age of twenty, but some may not appear until ten or fifteen years later.

Roughly speaking, infancy and childhood last about a dozen years, adolescence or the transition period about a dozen years, vigorous maturity about three dozen, and old age or decadence, one dozen. Some powers mature and fail earlier and others later than at these periods. There are also great individual differences as to the age at which maturity is achieved, and at which decadence begins.

SIGNIFICANCE OF INFANCY

A fish has practically no infancy; its form is nearly that of the adult; it can do almost everything the adult

fish can do, and it is possible to teach it little or nothing. A robin is helpless at birth, yet practically mature at two months. A chicken does not need to learn to walk and take food, is independent in a few weeks, and completely mature before a year, though retaining considerable capacity for learning. The child is helpless for months, dependent for years, immature at least a score of years, and capable of learning for three score. In general, the animals that are most helpless in infancy have the longest period of immaturity, and keep longest their plasticity or power of learning, are more complex, more capable of variety of sensation and movement, and more intelligent. In other words, the longer the infancy of any species of animals, the greater its ultimate power and intelligence.

WHY HIGHER ANIMALS HAVE A LONGER INFANCY, THAN
THE LOWER

Looking upon an animal organism as a machine, the lower animals are more perfect at birth than the higher. They are like a complex "nickle-in-the-slot" machine, which responds in an appropriate way not only to one, but to several coins (stimuli). The fish has an almost unchanging environment and needs to do only a few things in order to secure food and avoid enemies; hence its mechanism from the first prepares it for most of the exigencies of life, and it need not and cannot learn much. It is sent out of nature's factory all ready to do the limited business of life necessary for its own preservation. Higher animals come into a much more complex environment, each phase of which requires a different response; hence infinite complexity of struc-

ture is necessary for them to transact their life business successfully.

Moreover, the environment varies according to the place in which the young animal is born, the season of the year, and its own movements ; hence it is nearly as impossible to prepare a higher animal by its original structure for a successful life as it would be to prepare a machine that would, from a single adjustment, perform with accuracy and despatch all the functions of a clerk (including the answering of customers' questions).

A machine may be constructed that will do part of the work of a clerk, but not all, for new situations arise which cannot be provided for by any fixed mechanism. This is especially true when he changes from one department to another, or one kind of business to another, or adopts new and improved methods. In a similar way the higher animals, in order to do their life work and live, must have the power of adjusting themselves to the environment into which they are born, and of adapting themselves to changes in that environment. To do the first, they must be incomplete at birth and capable of being modified by experience till they fit their environment ; and to do the second they must retain something of their plasticity or capacity for being modified, so that if the environment changes they can again make the necessary adjustment to the new situations.

Infancy is therefore the period during which the more complex organisms are perfected by further internal development and by activities which prepare them to react appropriately to the various phases of their environment. In other words, it is the period for developing the native powers of the individual and for

learning how to live in the environment in which he finds himself.

HUMAN INFANCY AND PLASTICITY

Man is the most complex of animals and also the most capable of preserving himself in diverse climates and conditions of life; hence it is not surprising to learn that he is born with the greatest capacity for being modified to suit his environment. He is less mature, has fewer fixed modes of reaction to stimuli than other animals, and the period of his immaturity lasts from five to a hundred times as long as in others of the higher animals. Clearly, therefore, infancy is of vast significance in a human being, and a man's characteristics at various ages are more largely due to modifications produced by his own and less to race experiences than is the case with any other animal. Man has more instincts than any other animal, but his instincts are all subject to greater modification by experience. Plasticity is not only greater in man, but greatest in early life. The more fundamental physical characteristics of a man are fixed at twenty-five, and the mental at thirty-five; yet plasticity in minor details is retained till the period of decadence.

Not only is the period of infancy longer in man than in animals, but it is longer in civilized than in savage people, and is constantly becoming longer. As life becomes more complex, more special training is needed before a young man is prepared to make a living for himself. The age of entering upon business and professional life is therefore from five to ten years later than it was fifty years ago.

Not only is the period of infancy or preparation for living longer, but there is more need for the preservation of plasticity in every individual as long as possible; for the environment is constantly changing with the invention of new machinery and methods, and advancement in knowledge and social relations. Men who have not sufficient plasticity to adapt themselves to these changes quickly fail in the struggle for existence. The function of education in a progressive nation is therefore not merely to develop habits suited to present conditions of life, but also to develop adaptability that will enable the individual to fit himself to new conditions as they appear.

In the evolution of the race a long period of infancy has been of great significance. The helplessness of children kept parents together, and thus family life, which is the basis of all social life, had its beginning. Moreover, the task of caring for and training children gives an education that could be achieved in no other way, and contact with such enigmatic and variable creatures renews the youth of adults and helps them to preserve their plasticity. Not only does man's superiority to animals depend largely upon his longer infancy, or, in other words, upon his greater plasticity, but the position of each nation as a civilized power and of each individual in society is also largely determined by ability to respond to new situations in new ways.

INNER AND OUTER FACTORS IN DEVELOPMENT

We never know the nature of a material object until we bring it in contact with other substances and with new forces. In a similar way, we do not know the

nature of a child until we have observed his actions under various conditions. Not only do we not know what the child is until we have observed his actions under various circumstances, but he actually acquires new characteristics in the presence of each new person and in the performance of each new action.

What a child is, therefore, at any given time, is developed from what he was at the beginning, and what he has acquired by his reactions. What he may be is potentially present at first, and can become actual only after certain phases of his nature have been developed by experience. A grain of corn has the potential power of producing other grains of corn, but it cannot actually do so until it has been subjected to heat and moisture, and has developed leaves, stalk, tassel, and silk. In a similar way the child has various powers that cannot become actual until environment has developed certain others. No conceivable environment can make corn develop characteristics of the oak, or make it produce grain before it produces leaves. So the child must become a human being, develop in a certain way; each instinct, just as truly as the beard, has a definite time for development.

Since, however, man is the most plastic of all beings, the order of his development is subject to great modification. This is especially true of his mind. Unlike other machines, the brain is always in process of construction, always being modified and never completed. A machine may be used for threshing oats for several years, then it can be used with equal success for threshing wheat; but a brain used in the botanical classification of plants must be changed by practice before it is cor-

respondingly useful in the grammatical classification of words. Every time the mind does a thing it becomes a different mind ; hence the factors of nature and nurture are almost inextricably mingled in psychical development, and this makes the natural order of development exceedingly difficult to determine.

The question is often asked whether certain characteristics are native or acquired. The answer might be in nearly every case, "They are both." Native powers may lie dormant unless awakened and stimulated to activity by environment. On the other hand, nothing wholly foreign to one's nature can be acquired and made a permanent part of one's self. The relation of outer and inner factors in development is well illustrated by experiments on the optic nerve. The acquisition of a medullary sheath is supposed to mark the beginning of functional activity in nerve fibres. Does the acquisition of the sheath make functional activity possible, or does the beginning of function cause the sheath to develop? Some kittens of the same litter were kept blinded so the optic nerves were not acted upon by light, while the eyes of the others were opened and thus early subjected to the influence of light. At varying intervals the kittens were killed and their optic nerves examined. It was found that those which were kept blinded acquired their medullary sheaths without the stimulus of light, but much less quickly than the others. In this case the inner tendency was finally effective, even when the outer stimulus was cut off. In many other cases, however, where the inner tendency is less strong, outer influences are probably necessary in order that the inner possibility may become an actuality. All

acquisitions, therefore, have for their roots inner tendencies, and all inner tendencies remain undeveloped or develop slowly without the action of favorable outer influences.

THE PROBLEM TO BE SOLVED

To study the outer and inner factors in human development, and to determine how the inner factors are modified by the outer, is the work of child study. It must discover the natural order of physical and mental development and the modifying effect of various conditions and activities at different stages. It must find what characteristics are, or tend to be, the most prominent at each age by determining the time of emergence and greatest prominence of each of the numerous instincts.

In order to eliminate the influence of environment, the test of generality must be applied and care must be taken that the instincts given form and intensity by special conditions are not confused with more fundamental or normal instinctive tendencies. For example, if all the children of about four years, in a village by the seashore, play at making and sailing boats, the inference may be drawn that there is a natural tendency to engage in those occupations at that age. Further observations show that in other localities the play occupations of the children are in all cases characteristic of the neighborhood. Everywhere children of four years imitate, but what they imitate varies with their surroundings; hence the correct generalization is that the tendency to imitate is strong at four years, because of inner laws of development, but that the particular form of imitation is determined by surroundings.

In other lines of child study the problem is similar. In every case we ask what inner tendencies are prominent at each age, and how these tendencies are developed and modified by outer influences. 'Child study is, therefore, concerned with all the characteristics that are present at birth in so far as they differ from those of adults, and with the general laws of development, according to which changes in size, structure, and instinct take place between early infancy and complete maturity.

GENERALITY OF INNER FORCES OF DEVELOPMENT

The inner forces which determine the form, structure, and actions of each individual and the changes he shall undergo in reaching the adult stage are of three degrees of generality: (1) those determining what is characteristic of all animals of the species; (2) those determining what is common only in a certain family or group of families, and (3) those producing the distinctive peculiarities of the individual. The first is the result of the whole history of the species and its ancestors in certain environment or environments; the second, of a portion only of the species and in a more limited environment; while the third is the result of the union of slightly unlike parents and of influences acting upon the individual organism during the embryonic period. Bismarck had the common characteristics of all human beings, he had also the characteristics prominent in Germans, and the individual peculiarities that made him Bismarck, rather than any other German.

The science of child study is chiefly concerned with the characteristic tendencies manifested by all children; yet it throws light on the more special characteristics of

nations and individuals in certain environments. The educator needs to know what is usually true of children at each age in order that he may find the activity best suited to that age. The teacher, however, needs to be familiar not only with the characteristics common to most children of the age she has in charge, but also with their national and individual peculiarities.

Exercises for Students

1. State physical differences between children and adults that you have noted or are able to discover.
2. State mental differences between children at different ages.
3. Mention various standards of maturity for men and women recognized by society as fitting for certain purposes.
4. Tell what you have observed regarding the young of animals as to helplessness and length of infancy.
5. Mention instances where men have succeeded because of plasticity where others failed. Is plasticity needed more or less in children than in animals? Why?
6. Give illustrations of children showing different characteristics in new surroundings and to different persons.
7. Can you tell what characteristics are common at a certain age by studying children of one locality and nationality only? Why? Illustrate.

Suggestions for Reading

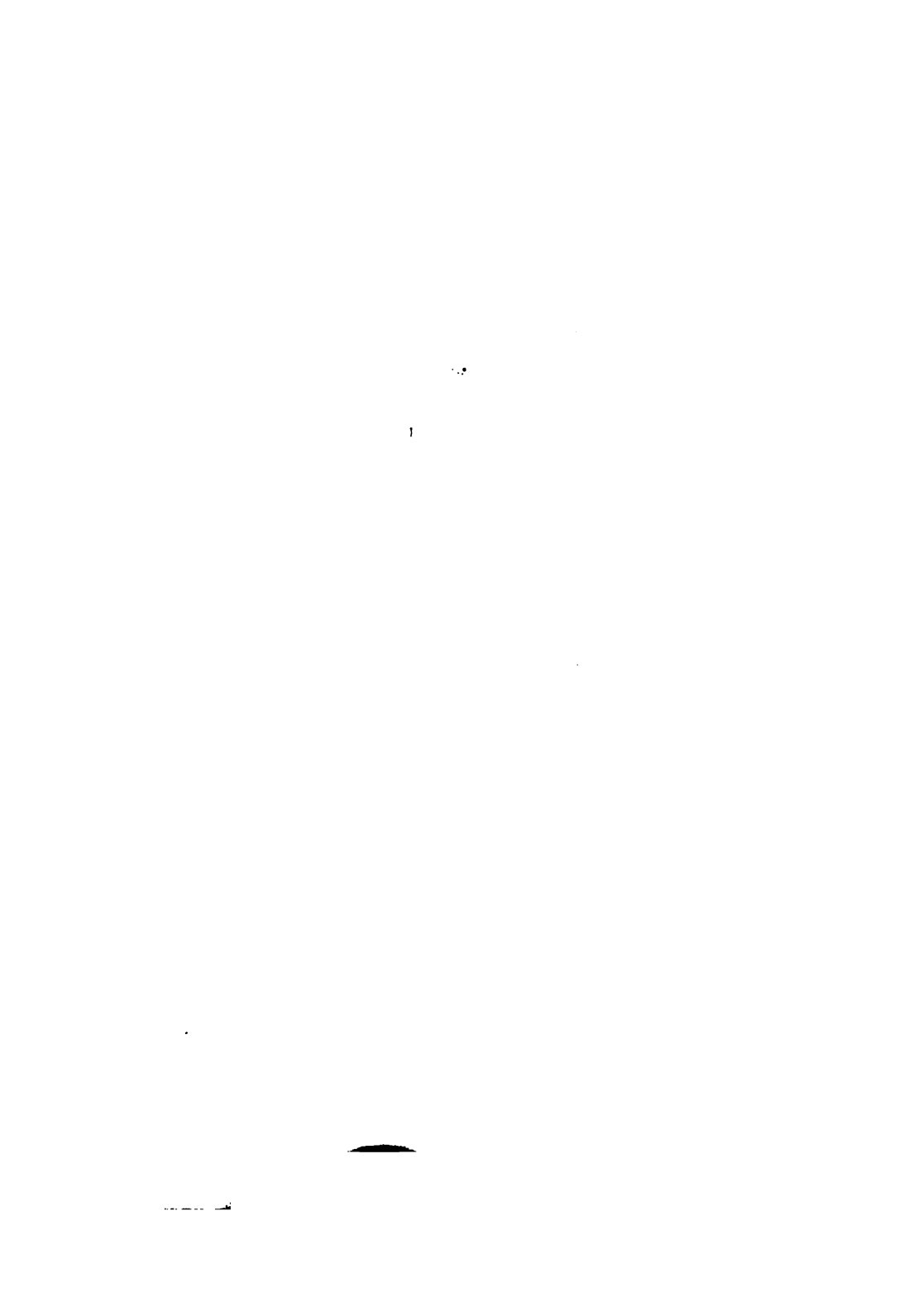
On physical differences between children and adults, see Oppenheim, chaps. ii and iii.

On the new science of child study, see Hall, *Forum*, Vol. XVI, pp. 429-441; Chrisman, *Forum*, Vol. XVI, pp. 728-736; *Ed. Rev.*, Vol. XV, pp. 269-284; O'Shea, *Jr. Ped.*, Vol. XI, pp. 9-25, and Scripture, *Ed. Rev.*, Vol. VIII, pp. 236-239.

On old age, see Scott, *Am. Jr. Psych.*, Vol. VIII, pp. 67-84.

On the stages of development, see Chamberlain, chap. iv, and Sanford, *Am. Jr. Psych.* Vol. XIII, pp. 426-449.

- On infancy of animals, Mills, *Animal Intelligence*, Part III, and Spaulding, *Pop. Sci. Mo.*, Vol. LXI, pp. 126-141 (reprinted); Thorndike, *Psych. Rev.*, Vol. VI, pp. 282-291.
- On meaning of infancy, see Fiske, *Excursions of an Evolutionist*, chap. xii; *Destiny of Man*, chaps. iv and vi; Butler, *Ed. Rev.*, Vol. XIII, pp. 58-75, or *Meaning of Education*, pp. 3-34; Christopher, *Trans. Ill. Ch. S. Soc.*, Vol. II, No. 2, pp. 109-114; Chamberlain, chap. i; Pycroft, *Pop. Sci. Mo.*, Vol. LXII, pp. 108-116.
- On instincts and education, see Balliet, *Physical Ed. Rev.*, Vol. VIII, pp. 1-7.



CHAPTER II

PHYSICAL GROWTH AND DEVELOPMENT

GENERAL PHENOMENA OF GROWTH

IF we were introduced into a factory where little machines were taking into and making part of themselves, wood, iron, and other manufacturing materials, and thus gradually becoming large machines, each of its own kind (*e.g.* locomotives, sewing machines), and that without stopping a cog, crank, or wheel during the enlargement, we should be astonished beyond measure. Yet this is what organic machines (plants and animals) are doing in nature's factory all around us. Milk, grass, and grain are transformed into horses, cows, chickens, and children, with the proper characteristics of each; and all the time bones, muscles, and blood vessels are enlarging without a pause in the working of the organism. Only familiarity prevents us from continual wonder at this miracle, repeated in a thousand different forms each year.

Every organism begins as a single cell, and by taking in and transforming nourishment, it grows into an individual of its species. All increase in size is the result of two processes: (1) increase in number of cells by division, and (2) enlargement of the cells thus formed. Growth during the embryonic period is due mainly to the first cause, and after birth to the second. The body

of a child is composed of about as many cells as that of an adult; hence his growth is principally by the enlargement of cells.

The importance of inner tendencies is well illustrated in physical growth and development. The law of motion, that a body once set in motion continues to move forever and at the same rate unless acted upon by some other force, does not apply to growth. An organism does not grow forever when once started, nor is the rate of growth uniform, but it grows at a varying rate till the size of its species is attained, then it stops. It is not even possible to change, except within narrow limits, the rate, amount, or direction of growth, by changes in food and surroundings. Evidently each species is so organized that it grows about so much during a certain time, and lives about so long. That size is determined largely by the number of elements in the germ cell is indicated by recent experiments upon the embryos of lower animals. It has been found, for example, that if the embryo of a frog is divided into two or four parts, each part will develop into a whole frog, but of a correspondingly fractional size and length of life.

GENERAL TRUTHS REGARDING GROWTH OF CHILDREN

The most rapid growth is before birth, for the infant at birth is five million times as large as the original germ cell. After birth the most rapid growth is during the first year, when it is nearly threefold. From this time on increase in size is less rapid, and in general the rate slightly decreases till about the eleventh year, when there is an acceleration in growth, first in height, then in weight. The acceleration in growth begins earlier

in girls, but lasts longer in boys. In both, the stage of rapid growth at puberty is preceded and followed by a period of slow growth, and again in both, rapid growth in height precedes rapid growth in weight. Since girls begin growing rapidly while boys are in the stage of slow growth, girls are for a year or two taller and heavier than boys. The age at which this occurs in girls is about twelve years, but varies a year or two in different countries. Growth is usually complete before twenty, at least as regards height.

Measurements of individual children show that in general a period of rapid growth in height or in length of limb is a period of slow growth in diameter, and, conversely, rapid growth in diameter occurs at the time of retarded growth in length.

FACTORS DETERMINING GROWTH

The truths regarding growth stated in the preceding topic apply not merely to the people of one race, or to those with the same habits of exercise and eating, but to all peoples from which statistics have been obtained; hence these variations in growth must be the result of, or are due to, inner tendencies common to all of the human species. Heredity is another less universal inner tendency determining growth, as is shown by the fact that people of certain nations mature earlier or attain a greater size than those of others. There are also tendencies to certain accelerations of growth that are peculiar to individuals; for not all children, even of the same family, grow at the same rate at the same age. Neither do they all attain the same size when outer influences are the same. The amount and rate of

growth of every child is thus largely determined by inner tendencies.

Outer influences, however, such as climate, exercise, and nutrition may modify rate and amount of growth.

Climate, especially temperature, may be a factor in growth, in as much as seasonal variations are marked; increase in the height of children is greatest in the spring and early summer, while increase in weight is greatest in the fall or early winter. This may be interpreted as the result of an inner tendency to rhythmic seasonal growth, or to the effects of variation in temperature. People in warm countries mature more quickly, but do not reach a greater size than those in cold countries, hence we may infer that heat does not increase the ultimate size of human beings. People of the Arctics and the Tropics are as a rule not large, hence a temperate climate is probably more favorable to the greatest growth.

Exercise may modify amount and rate of growth to some extent, but its greatest effect is probably in the substitution of muscular for fatty tissue in certain parts, without much change in ultimate size. The fact recently noted that children engaged in manual training during the summer showed less than the usual variation in growth, with change of season, suggests that seasonal variations in growth may be due to change in occupation as much as to change in temperature.

The fact that children of the well-to-do, and presumably better fed classes, are larger than those of the less favored class, seems to indicate that *nutrition* is another important factor in growth. In England this might be partially explained by heredity, but not in

this country. The fact, however, that the rate of growth of children in both this country and in England is less in the well-to-do classes during school life from the ages of six to eighteen than it is in the poorer classes, shows that the effects of good or poor nutrition must be limited to the period preceding the school age. It is altogether probable that poor nutrition has the greatest effect during the embryonic period and the first year or two of life when growth is rapid; hence, though both infants and adults of the poorer classes are smaller than of the more favored classes, yet the amount of growth from six to eighteen is greater in the former than in the latter.

A temporary condition like *sickness* nearly always retards growth; but if recovery is complete, there is usually a period of rapid growth in which the time lost is made up; hence, though the time of growth may thus be modified, the total growth is probably affected only by prolonged illness or other unfavorable conditions.

GROWTH OF PARTS

The facts previously mentioned as to the difference in the relative size of parts in children and adults are only some of the most striking instances of the general truth, *each part increases in size according to an inner law of its own*. Other facts equally striking are as follows: the brain increases in weight about four times, the heart thirteen times, and the lungs twenty times. The weight of the brain of boys at birth is 12.29 per cent of that of the body, while at twenty-five years it is only 2.16 per cent of the weight of the body. The changes of other organs are: heart, from .76 per cent to .46 per

cent; right lung, .94 per cent to .77 per cent; liver, 4.6 per cent to 2.8 per cent; and kidneys, .75 per cent to .46 per cent. The shape of the organs also changes with age. For example, the Eustachian tube is not only relatively short in the child, but it is absolutely broader than in the adult; while the child's stomach is much more tubular in form and more nearly vertical in position than the adult's.

The law governing the growth of each part must, however, be consistent with the general law governing the growth of the body as a whole, otherwise the proportion of parts would vary to such an extent that organic processes would be disturbed, and life and health could not be maintained. Presumably it is advantageous for the proportion of parts to vary at different ages when there are different functions to be performed and when the physiological processes of respiration, circulation, and digestion are undergoing change.

HEALTH AND GROWTH

Normal growth is in general a sign of good health, while very rapid or very slow growth is usually a sign of poor health. The period of rapid growth at the beginning of puberty is generally a critical period both physically and mentally.

There is difference of opinion, however, as to the relation of growth to health at this time. It is held by some that health is likely to be interfered with by this rapid growth. This may be true in individual cases; but the investigations of Hertel and others show that there is less illness among boys and girls during the period of

rapid growth than in the years of slow growth immediately preceding and following. To this it is replied that though there is not actual disease, there is usually some debility that with a little overstrain may result in illness; hence requirements, especially in school, should be lessened at this time in order that all the energy may be expended in growth. The facts, however, do not support this view, for most youths are more energetic and restless at this than at any other time (though some individuals are sluggish and listless), and experiments prove that at this time there is a great increase of muscular power and size of vital organs, especially the lungs. The argument that ill health often dates from this period is answered by the fact that recovery also often takes place at this time through what is called "out-growing the disease."

There is no ground, therefore, for the view that in general either physical or mental work should be discarded during this period, though such is undoubtedly advisable in individual cases. Moderately rapid growth is always an accompaniment of health and vigor. The only difference is that at this time growth is normally more rapid than at other times. Abnormally rapid growth is likely to be accompanied at this as at other ages by poor health and imperfect development.

Why, then, is the period of rapid growth at puberty a critical period? Largely because health depends upon the equilibrium of all parts, and when growth is rapid there is more chance for unsymmetrical development and consequent disturbance of equilibrium. A rapidly moving bicycle does not readily lose balance; but if it does, the results are disastrous, and the same is true of a

rapidly growing organism. The development of new functions at this age also complicates the situation. Although at this time a youth can often do more work and endure more hardships than at any other time, yet if an obstruction is not overcome, the results are more serious than at any other time. The rapid growth of this period calls not for less work but rather for more, yet care must be exercised that there be no overstrain. At this time is needed not stimulation or repression but direction, in order that development may correspond to growth and be of a desirable kind.

GROWTH AND DEVELOPMENT

These two terms are often used interchangeably, probably because the processes usually take place together. Their meaning is, however, different, and there is often a lack of correlation between the processes.

Growth, properly speaking, refers only to increase in size of parts, and the consequent change in size and shape of the body as a whole. It is the result of increase in the number or size (or both) of the cells composing the body. Development more properly denotes changes in character and connection of cells. If an infant were to grow to adult size without any corresponding change in cells, he would be utterly incapable of sustaining his weight, with his cartilaginous bones and flabby muscles not yet connected with controlling nerve centres. It is a fact well known to physicians that deficient or improper nutritive conditions often affect development more than they do growth. A child may be quite large for his age, but poorly developed because of lack of mineral matter in the bone cells, just as a plant in a dark

cellar may attain great size but be utterly lacking in the essential qualities of a healthy plant.

Arrest or acceleration of growth and development together is probably less serious than of either alone. When they take place together, subsequent growth and development are not necessarily interfered with. Cells probably tend to change in character when increasing in size, and to change in size when being modified in character. Changes of one kind only are usually extreme and disturbing, hence it may be stated as a general rule: *rapid growth should be accompanied or quickly followed by a corresponding change in development in order that arrest of development may not occur.*

After the inner growth tendencies have worked themselves out, and full normal size is attained, there is still some possibility of change in size of parts, especially of muscles. Sickness and lack of exercise decrease their size, while, in health, exercise increases it. Ordinary exercise during middle life maintains the size of muscles, while in old age the muscles are decreased rather than increased in bulk by special exercise. The old man of eighty who increased the size of his calves by bicycle riding, was an exception to the general rule. The term "development" is sometimes applied to special increase in size of parts, produced by exercise, but the word even then usually implies also change in quality of the part. A muscle, for example, when exercised, increases in hardness more than in size.

What is true of muscles is true of nerve centres to a considerable extent. They are capable of less growth through exercise than muscles; but they have greater capacity for development, or, in other words, for changes

in cells and in connections between cells. Growth of the brain is nearly as complete at six as is growth of muscle at three times that age, whereas development of nerve cells is not complete at twice eighteen. Growth of the brain is due almost wholly to growth of the fibres connecting cells with each other, and this is an important phase of development, since the cells are thus brought into harmonious relation. The increased mental power that comes with age and training is the result, not so much of changes in individual cells, as of changes in those connections between cells which make possible the use of many parts of the brain in the accomplishment of a single purpose.

NATURAL ORDER OF DEVELOPMENT IN RELATION TO EXERCISE

Whatever may be true of the effect of exercise upon growth as a whole, it cannot be questioned that development is promoted by moderate exercise of the whole body. This is true during both the growing and the mature stage of life. As to particular parts of the body we know that changes in growth and development may be produced by prolonged exercise of certain parts. This is well shown in the various types of athletes with extraordinary leg, arm, back, or chest power.

Again, occupations requiring the use of one arm or one leg only may produce over-development on one side. Such excess of development of one limb over the other is, however, limited. Experiments show that when the right arm is used, nervous impulses are sent to other muscles than those used, and also to the corresponding muscles of the left arm. Other muscles than those used

of the right arm, and also the muscles of the left arm, therefore gain in size and strength from systematic exercise of certain muscles of the right arm only. For this reason some degree of symmetry is preserved when the exercise is largely one-sided. The development of internal organs is also affected by exercise of other organs; hence the dangers of over-specialization are diminished by this partial diffusion of the effects of exercise. Yet it is not difficult to destroy bodily symmetry by over-exercise of parts, while equilibrium of functions of different parts is still more easily disturbed, so that ill health and death are not infrequent results of extreme specialization in exercise, *e.g.* a man who developed his muscles so that he could lift three thousand pounds died from nervous exhaustion.

The effects of exercise on growth and development are practically the same for nerve cells as for muscle cells, except that the changes in size are not so great in nerve cells. Nerve cells not exercised because of loss of a limb or of a sense at an early age, as in the case of Laura Bridgman, are not quite as large as other cells and much less developed, *i.e.* have fewer processes extending out from them.


Muscular ability depends not so much upon the degree of development of muscles as upon the harmonious working of all the muscles concerned in a movement. It is therefore more a matter of nervous connections than of muscular strength. This is perhaps best illustrated in throwing and in wrestling, where victory goes not to the strongest but to the one whose muscles work together to the best advantage. A skilful thrower uses first the muscles of the legs, then succes-

sively those of the body, shoulder, arm, forearm, wrist, and fingers, and the ball, shot, or hammer leaves the hand with a force equal to the sum of the forces exerted by these muscles. An unskilled thrower, on the other hand, uses principally the muscles of shoulder and upper arm, and these not in harmony; hence, though he have the arm of a blacksmith, he may be beaten by a strippling base-ball pitcher.

It is evident that special exercise of parts may be injurious because it over-develops the parts exercised, and hinders rather than helps in the harmonious working of part with part. Extreme specialization is therefore to be avoided at all times.

During the growing period when plasticity is greatest, extreme and permanent specialization is much more readily produced than in adult life when plasticity is less and parts are already normally developed. It may even be questioned whether, in growing children, all specialization is not over-specialization. Boys who specialize in one form of athletics at an early age in the secondary schools are likely to fail in college and university contests.

On the general principle that development should accompany or follow growth, it is probably best for children to have more exercise of one part at one time and of others at another; hence the tendency often noticed in children to specialize in one direction for a while, then in another, is probably a good thing. Such specialization is directed by play and occupation interests, but is probably really determined largely by growth and development changes. Such specialization is usually temporary and in accord with the natural order of



growth and development, hence it is not injurious or disturbing.

If we knew the natural order in which the nerve and muscle centres grow and develop, we could perhaps devise physical and mental exercises that would be most favorable to perfect development at each stage of life. In the absence of such knowledge any attempt at special training during the growing period may interfere with the natural order of development, and disturb instead of promote harmony of function.

In all schools certain physical and mental activities are performed over and over every day; hence with reference to all the child's powers there is a great deal of specialization, though the training is intended to be general rather than special. It is altogether probable, therefore, that in giving children the training they will need in later life, at a time when they are in an earlier stage of development, we are to a considerable extent interfering with their natural order of development.

The studies of Bryan, Hancock, and others have demonstrated what is evident to every close observer, that, in general, children use the larger muscle groups earlier than those concerned in finely adjusted movements. It follows, therefore, that the large number of finely adjusted movements required in making small letters accurately at an early age must result in a specialization of the smaller nerve and muscle centres long before their natural time of development. Poor writing and drawing, which nearly always appears in about the sixth grade, may be one of the effects of lack of harmony in development, produced by the premature or excessive training of the finer muscle centres.

In the more purely mental sphere there is general agreement among students of children that children form crude, indefinite ideas involving only a few of the most obvious acts of analysis and synthesis. These ideas become more exact and definite with increased experience, just as movements become more accurate and definite with practice.

There can be no doubt, therefore, that the detailed analyses and exact definitions so often required of young children are opposed to the natural order of brain development, and therefore destructive of interest and disturbing to the natural processes of mental growth.

As the science of child study progresses, such interference with the natural processes of physical and mental development should become less and less. In the meantime, children should have plenty of opportunity to get an all-round physical and mental development from their plays and games, as a corrective of whatever injurious specialization is being produced in school.

Exercises for Students

1. Have pupils study growth tables and recall their observations, then decide whether rapid growth in individual children extends over a longer or a shorter period than that indicated in the tables, and whether growth in individuals is apt to be more or less rapid than is shown by the tables. If all children had their period of rapid growth at the same age, could the period of rapid growth be shorter in individuals than in the table?
2. Have pupils mention individuals of large or small size, and give probable cause.
3. From observations and tables, report as many marked changes in size or shape of parts with age, also as many changes in physiological processes as possible.

4. Give illustrations of growth of parts due to special exercise, or lack of growth due to want of exercise. Why do insurance companies ask the height and weight of those they insure?

5. Observe how very young children throw, and how they make the movements of scribbling when they first attempt to draw, as bearing on the question of what muscle centres develop first.

Mention specifically school exercises that require too much fine muscular adjustment. Why is it more injurious to children than to adults to work in factories? At what age is it best to begin giving special training only?

6. The body of an adult is 58.5 per cent water, that of an infant 74.7 per cent, and of a foetus 94.5 per cent, while the amount of animal matter in the bones of an infant is 2.24 per cent, and in an adult 7.29 per cent. What do these facts signify as regards growth and development? Give others.

7. May awkwardness and growing pains be explained by inequality in growth of parts, as of bones and tendons, and by want of proper relation between growth and development?

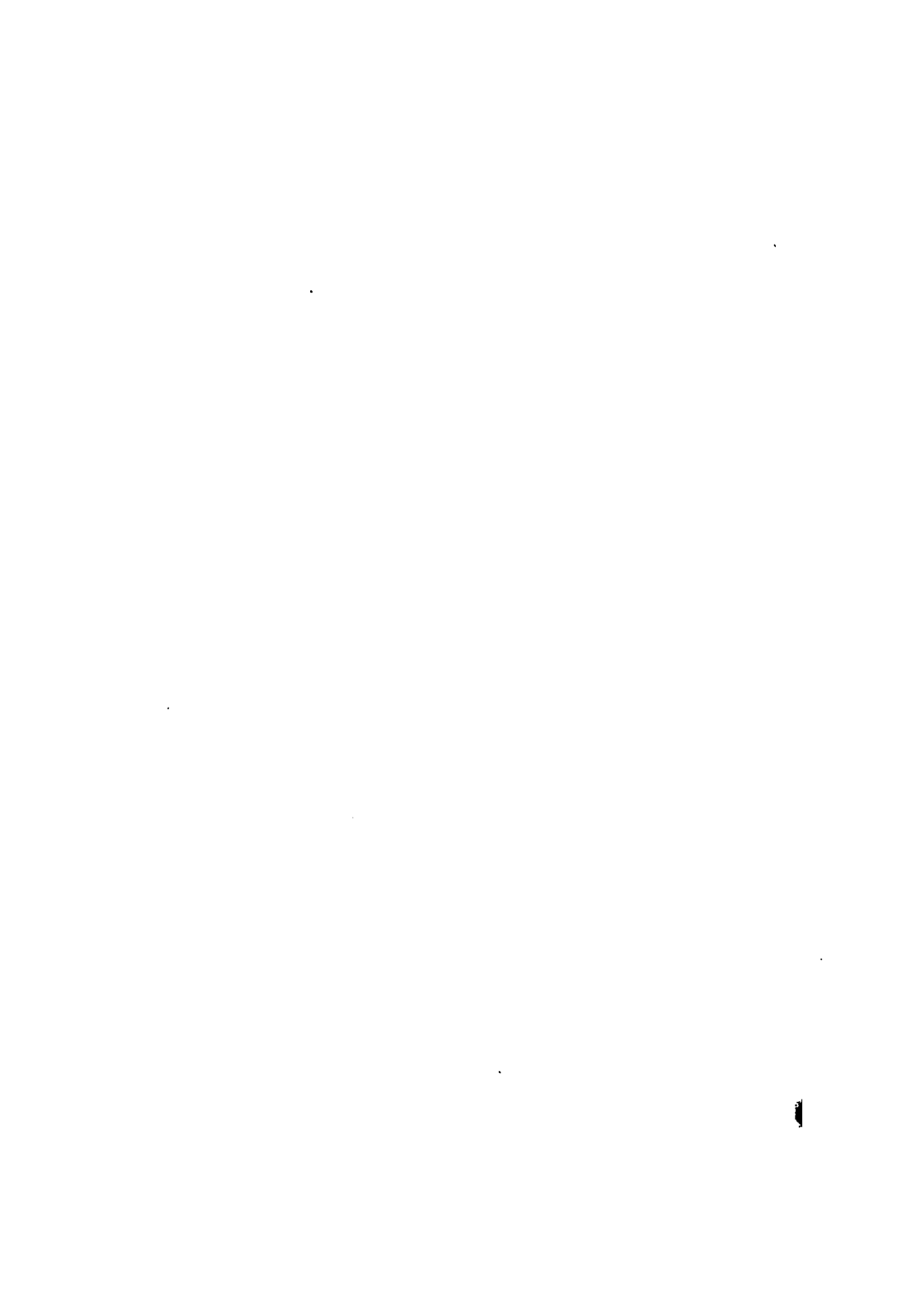
Can you see how growth changes might produce changes in such habits as writing?

Suggestions for Reading

On growth, read Donaldson, *Growth of the Brain*; Porter, *Am. Phys. Ed. Rev.*, Vol. II, pp. 155-173, or *Trans. Acad. Sci.*, St. Louis, 1893, Vol. VI, pp. 161-181; Gilbert, *Yale Studies*, Vol. II, pp. 40-100; Mrs. W. S. Hall, *Ch. S. Mo.*, Vol. II, pp. 332-342; Christopher, *Reports on Child-Study Investigations*, reprints from the reports of the Chicago Board of Education for 1898-1899, 1899-1900, 1900-1901; Hastings, *Manual*, chaps. iii and iv, or *N. E. A.*, 1899, pp. 1076-1084, and Burke, *Growth of Children in Height and Weight*, pp. 73, reprinted from *Am. Jr. Psych.*, Vol. IX, pp. 253-326, and, if desired, other references given by Burke.

On growth in relation to health, see Key, *Pop. Sci. Mo.*, Vol. XXXVII, p. 107; Christopher, *Ch. S. Mo.*, Vol. III, pp. 324-335; *Jr. Ch. and Ad.*, July, 1902, pp. 190-199; O'Shea, *Jr. Ped.*, Vol. XI, pp. 299-316.

- On diffusion of impulses and the effects of exercise, see Davis, *Yale Studies*, Vol. VI, pp. 6-50, or *Science* (N. S.), Vol. X, p. 20; Johnson, *Yale Studies*, Vol. VI, pp. 51-103; Scripture, *Yale Studies*, Vol. II, pp. 114-119.
- On the natural order of development in relation to exercise, see Burk, *Ped. Sem.*, Vol. VI, pp. 5-64; *N. E. A.*, 1899, pp. 1067-1076; Patrick, *Pop. Sci. Mo.*, Vol. LIV, pp. 382-391, and Gulick, *Pop. Sci. Mo.*, Vol. LIII, pp. 793-805; Bryan, *Am. Jr. Pysch.*, Vol. V, pp. 125-204, and Hancock, *Ped. Sem.*, Vol. III, pp. 9-29; Sargent, *Physical Ed. Rev.*, Vol. VIII, pp. 57-69; Gulick, *Physical Ed. Rev.*, Vol. VIII, pp. 70-74.
- On arrest of development, see Dawson, *Am. Jr. Psych.*, Vol. XI, pp. 188-197; Harris, *Education*, Vol. XX, pp. 453-466.



CHAPTER III

NATIVE MOTOR ACTIVITIES AND GENERAL ORDER OF DEVELOPMENT

KINDS OF NATIVE MOVEMENTS

MAN can make machines that move about and do various kinds of work, but they all need a person to start and direct them. Nature, however, makes animal machines that move around and do various things without any one to superintend their movements. To do this safely, they must be self-running, self-repairing, and capable of moving so as to secure food and avoid danger.

The movements necessary to change food into force and keep the internal machinery in running order are carried on almost wholly within the body, and are therefore called *automatic*. All the movements of the muscles of the lungs, heart, blood-vessels, and intestines concerned in the processes of respiration, circulation, and digestion are of this continuous, rhythmic, and self-perpetuating character. They depend mainly upon the relation of different parts of the organism to each other, and very slightly upon the relation of the organism to its environment.

The movements involved in securing food and escaping danger, on the other hand, are partially or

wholly originated by contact of the body with something in the surroundings. In other words, they are called forth by an external stimulus. Some are simple or reflex, and others complex or instinctive.

The simple or *reflex* movements are, as a rule, the response of a single part of the organism to a simple stimulus to that part. Examples are, the winking of the eye when the lid is touched, or jerking the hand away when it is pricked. Such movements occur whenever the appropriate stimulus is given, whatever the internal condition of the animal. The mechanism controlling them is very accurate, for just as the nickel-in-the-slot machine will not respond to a penny, so the hand will not be jerked away when touched, but only when injuriously stimulated, as by a prick or burn. All parts of the body are thus protected by reflex movements.

The complex or *instinctive* movements are a response of the whole, or a considerable part of the organism to some external stimulus, such as taking, chewing, and swallowing food, and the movements of avoiding danger by hiding, running, or fighting. These movements, though initiated by an appropriate stimulus, are to some extent dependent upon internal conditions or stimuli. An infant will suck whenever his lips are touched, if there is also the internal condition or stimulus of hunger, but not if the stomach is full or out of order; and a hen will sit on a nest if she is in a broody condition, but not otherwise. Instinctive movements differ from reflex movements also in the fact that they are for the good of the whole body instead of for some one part. Winking the eye and jerking away the hand protect only the eye and hand, while taking food benefits not the mouth but


the whole body, and running saves not merely the legs but the whole animal from danger.

Instinctive movements, such as sucking, are probably in reality nothing but a combination of reflexes. When the tongue and lips of an infant are rendered sensitive by hunger, contact with any object causes them to close around it reflexively. This movement affects the breathing reflex and causes sucking movements. The stimulus of milk on the tongue and the throat calls forth the reflex movements of swallowing. Loeb has thus analyzed a number of instincts into a series of reflexes, and it is probable that all instincts are merely a combination of reflexes in which the reaction of one part excites others, with the result that the animal acts as a whole and for the good of the whole.

INSTINCTS AND STRUCTURE

The relation of instinct to intelligence or reason has long attracted wondering attention, but until recently little notice was taken of the relation of physical structure to instinct. When the matter is once suggested, however, no extended observation is needed to show that the instincts of any animal correspond to its structure. Cats do not try to fly or dive when chased by dogs, nor ducks to climb trees or fight with their claws. Turtles do not attempt to run from danger, or rabbits to curl up in their skins for protection. The peculiar structure of teeth and stomach in cows goes with a strong instinct to eat grass, and in the lion with an equally strong instinct to eat meat.

Even in the life of the same animal new instincts develop as new structures are formed or perfected.



Birds do not show the flying instinct until their wings develop, nor the nesting instinct until they are ready to produce young. Before their teeth and claws are developed, young lions run from large animals instead of attacking them.

There is good reason, therefore, for believing that every instinct of each species of animals has its basis in some peculiarity of structure. A slight difference in beak, claw, or wing of birds often makes a vast difference in the form in which the instinct to catch food, sleep, build nests, or escape danger, shall be manifested. A bird with the bill of a humming-bird and the instinct of a flycatcher, or one with the instinct of a woodpecker and the beak of a grosbeak, would be at a serious disadvantage in securing food.

Sometimes the difference in the actions of two species of animals is not easily accounted for by observation of external differences in structure, but in those cases a fuller knowledge of the internal anatomy of the animal, and especially of the nervous system, would probably reveal the basis of the difference. Every instinctive act must therefore have a mechanism appropriate to its performance, and in young animals this mechanism must be developed before the instinct appears.


INSTINCTS AND CONSCIOUSNESS

We all know that the *automatic* movements are carried on without consciousness. The apparatus for these movements works best when not interfered with by consciousness. A little attention to the matter will also show us that the *reflex* movements of the eye and the withdrawal of the hand are the results of a definite

mechanism which works without being started by consciousness. In fact, it is almost impossible for consciousness to prevent such movements. It is true that the fact of a stimulus being received and responded to by the hand or eyelid, is usually reported to consciousness, but that is after rather than before the movement begins.

That *instinctive* movements are also dependent upon mechanism rather than consciousness is not always so readily admitted. Yet the person who jumps at a loud sound or the sudden appearance of a frightful object, often says he cannot help it, and a moment after the fright may laugh at his own foolishness. When a cat races after a ball or a mouse, he does not think he wants it before trying to catch it, but the sight of the moving object sets the chasing apparatus in motion at once. In the same way the sight of a hawk excites the mechanism for making danger signals in the hen, and this sound causes the crouching and keeping-quiet apparatus to work in the young chicks. Persons and animals do not have to learn to do these things any more than they have to learn to breathe, and when performed suddenly they are just as independent of consciousness.

The mechanical character of reflex and instinctive reactions is well illustrated by the fact that a decapitated snake will coil around a red-hot iron as readily as around a stick. In this, as in other cases, there is evidently a definite mechanism which is set in operation by a certain stimulus or any stimulus sufficiently like it. The dependence of instinctive movements upon structure rather than consciousness is also shown with remarkable clearness by Jennings's experiments upon paramecia, one of the simpler forms of animal life. Their great



activity in moving around, taking particles of food, gathering in companies, approaching CO_2 and avoiding acids, gives the impression that their movements are directed by consciousness, and that they exercise choice. Careful experiment and observation, however, show that it is all a matter of mechanism. Their cilia are in almost continual motion, and thus their bodies are driven forward. If they approach acid, the cilia reverse, and thus they back off from that injurious substance. If, however, the acid is made to approach them from behind, the effect is the same upon the cilia, and instead of moving away from the fatal substance they enter it. CO_2 has the opposite effect upon the cilia, consequently when moving forward they enter and remain in drops of that. Choice of food is also lacking, for they take in every small particle they touch, whether it has food value or not. Careful observation thus shows that all their actions are purely mechanical.

Loeb has in a similar way analyzed the instincts of a number of animals into mechanical reflexes. For example, the apparatus for stinging is in the last segment of the abdomen of a bee, since when separated from the rest of the body the usual movement of stinging is made when the under side is touched.

Fixed instincts, like habits in man, work almost mechanically. Not only does consciousness not direct the activity, but so long as everything goes smoothly, there is little or no consciousness. Where acts are to be repeated over and over, and the same kind of movement made in response to the same stimulus, consciousness is unnecessary. It is only when several modes of response are possible that consciousness is of any use. Con-

consciousness can then distinguish the different possibilities and choose the one that past experience has shown will give the most desirable results. When a new animal is seen by another, the possibilities of friendly advance, of hasty retreat, or of vigorous pursuit are suggested, and consciousness decides in the light of past experience with similar animals which form of reaction shall be made. If, however, the animal that appears is a hereditary enemy, the action of fleeing is mechanically performed with very little consciousness, unless flight is in some way impeded, when other possibilities, such as fighting, hiding, or feigning death, are suggested.

An animal that had only one possibility of response in a given situation could make no use of consciousness. Only those animals that are sufficiently complex to have more than one mode of response to a given stimulus can profit by conscious intelligence. It is reasonable, therefore, to suppose that instead of consciousness making new movements possible, the acquisition of new possibilities of movement makes conscious intelligence possible and useful, especially in animals and children. With much truth, therefore, we may say that man makes many movements, not because of his great intelligence, but that he has great intelligence because of his many possibilities of movement. The marvellous skill of the bee in constructing his comb according to the best engineering principles is due, not to his intelligence, but to his mechanical structure, which renders it less easy or perhaps impossible for him to build otherwise.

Instincts, in as far as they are purely instinctive, are always blind. Only when two instinctive tendencies are aroused by a stimulus is the eye of conscious intelli-

gence opened to choose by the aid of the light of a past experience the most favorable reaction.

In the case of animals like fishes and insects with only a few fixed instincts, the light of experience reveals to the dim eye of consciousness no other mode of response, and the baited hook is again taken or the sizzling light again approached.

In higher animals, like chickens and children, a single flash of past experience, such as the unpleasant feeling of a furry caterpillar to the bill, or of a hot stove to the hand, reveals to the clearer eye of consciousness another more desirable mode of reaction when the same tactile or visual sensation associated with it is again experienced. The fewer the experiences necessary to produce the change in the reaction necessary to secure the most favorable results, and the longer the time before the light enkindled by past experience is extinguished, the greater is the intelligence in animal or child.

Not extraordinary skill in doing the same thing in the same way all through life, by one generation after another, as in the case of animals with fixed instincts, but ability to act in a variety of ways and to learn by experience, is evidence of intelligence. Man has more instincts than any other animal; but the variety of action thus made possible, and the modifications produced by experience, make it seem as if he had none. We must remember, however, that his purely instinctive actions are just as blind as those of the bee, and that consciousness is useful only after there has been experience, and when there is a possibility of more than one reaction.

CONDITIONS AFFECTING THE USEFULNESS OF INSTINCTS

Evidently every species of animal that does not in general act for its own good would, in the struggle for existence, soon become extinct, hence instincts are in general useful. What is for the good of a young animal depends upon (1) structure of the animal, (2) its surroundings, (3) its temporary bodily condition, (4) its age, and (5) the instincts of its parents.

(1) If dogs had the instinct to dive when threatened with danger, and fish to jump out on dry land, neither would long survive as a species. If the puny rabbit had the fighting instinct of the bulldog instead of the running instinct of the deer, his career would have been cut short long before this. This merely emphasizes the truth already stated, that instinct must conform to structure in every species of animal.

(2) What form of action is favorable depends upon the environment. Birds in the south need to go north when it gets warmer; but if they are in the north, they need to go south when it gets colder. If the climate is too wet for an animal, he needs an instinct that impels him to seek dry places; but if it is too dry, he should have an instinctive tendency to seek water. Some animals have two fixed types of instincts with action suited to the two kinds of environment with which they are likely to come in contact. All muskrat houses built in pools are on the same general plan, while a different, but equally constant, form is used when the nests are built in streams.

Instincts of animals that are useful to them in their natural environment may become destructive to them

when the environment is changed suddenly by geological agencies or by the entrance of man. Thus lights destroy countless insects and birds, and man makes use of the curiosity of animals concerning strange motionless objects, in luring them to destruction, and of the feeding instinct, to attract them by baits to his hooks and traps. Animals that most quickly adapt themselves to these changes in environment are the ones that survive in spite of man's cunning attacks. Every instinct must have developed in an environment where it was useful; but if the present environment is different, the instinct may be useless or injurious, and thus handicap or destroy instead of help preserve.

(3) The condition of the animal at the moment also determines the usefulness of his actions. An animal that would turn away from food when his stomach was empty, and eat it when his stomach was already filled, would not long survive. A deer that had a strong impulse to fight when shedding his horns instead of when they were well grown and firm, would be at a disadvantage in preserving himself and his species.

(4) It is evident that an animal when young and helpless and with parents to care for it, needs a different course of action from that required when well grown and dependent upon its own exertions for food and safety; while if it has young to care for, its instinctive action must be such that the species will be perpetuated. It follows, therefore, that to be useful, instincts must be adapted to different ages, as well as to differences in structure, bodily condition, and environment.

(5) It has been found that in general an animal at

CONTINUOUS, TRANSIENT, AND PERIODIC INSTINCTS

Since the structure of an animal and the usefulness of any form of action varies with age, we should expect that the instincts of any given species of animals would not be equally strong at all times. Observation confirms this view. Some instincts, like the feeding and fear instincts, are present at birth and last all through life, though usually they are more prominent at some times than at others.

Other instincts, like that of play, are not present at birth, but after they appear, continue to be manifested all or nearly all through life, though perhaps in a diminishing degree. The instinct of chickens to follow is a transient instinct, entirely disappearing in a short time if not developed by experience.

Other instincts appear only at certain times, as at the migrating season or when caring for young, and are therefore in a certain degree rhythmic or periodic.

The chief problem which child study has to solve is to determine the time at which each instinct of man is naturally most prominent. This being done, the problem of the educator is to apply the right stimuli at the right time, so as to produce the most perfect and rapid development according to his ideas of what is desirable.

GENERAL PRINCIPLES DETERMINING THE ORDER OF
DEVELOPMENT OF INSTINCTS

In the plant world the order of development — leaves, stalk, blossom, fruit — is very definite and fixed. In the animal world the growth of parts of the body and the appearance of hair, horns, etc., are nearly as fixed

and unvarying. Since structure and instinct are closely related, we should expect to find a definite order in which the instincts of each species of animal tend to develop. Observation confirms this view in a general way, as young animals do not show the mating, migrating, nest-constructing, and care-taking instincts of adult animals, nor adult animals the same degree of playfulness as the younger ones. When, however, we attempt to determine exactly the order in which instincts develop, many doubts and difficulties arise.

The most common theoretical statement of the order in which instincts develop is that they appear in the order in which they have been acquired in the history of the race, from the lowest forms up. This view is supported by the general biological law discovered in the study of embryology, that in the embryonic state each animal goes through stages of development in which it is successively similar in form or proportion of parts to a higher and still higher animal, till it attains the form of its species, and also by numerous parallelisms that can be pointed out in the development of a child after birth with that of the human race since it has become human. This law is supposed to apply not so much to the first appearance of the various instincts as to the time of their greatest prominence.

There are two other theoretical considerations, however, that should be given almost equal weight with this theory of correspondence in the development of the child and the race. In the first place, the strongest instincts should be those that have been most universally useful to all species of animals in all ages, rather than the oldest. For example, the swimming instinct

is probably one of the oldest instincts, but it has been of little use among many species of animals, hence it is not strong in all young animals. The instinct to withdraw from an unfavorable stimulus has, however, been useful to all animals in all stages of development; hence it is universally present and prominent in young animals.

Again, we have noted the truth that different instincts are needed at different stages of development; hence if instincts developed in the same order in the individual as in the race, in any species of animals, that species probably would not long survive, since the reproductive and care-taking instincts are useful to the species only when they appear in mature animals. Hence, though the parental instinct is one of the oldest instincts, it is yet one of the latest to become prominent in individual development.

CAUSES OF DIFFERENCES IN INDIVIDUALS OF THE SAME SPECIES

Besides these fundamental, theoretical principles to be considered in applying the main theory of correspondence between race and individual development, there are others, depending upon special conditions and upon the laws governing the development of instincts. Since the appearance of instincts depends upon structure and physiological conditions, especially nutritive, an animal must be in good normal condition to show forth at the proper time feeding, playing, fighting, and sexual instincts.

Since instincts depend also upon outer stimuli, the appropriate stimulus must be presented at the time

when, because of the internal bodily conditions, the instinct is ripe, or the instinctive reaction may never appear. For example, the swimming instinct does not appear in ducks except in the presence of water, and perhaps not without actual contact of the whole body with it. For this reason environment may favor the development of some instincts at certain times much more than at others. If the proper stimulus is never given, or if the instinctive tendency is transient, as is sometimes the case, the instinct may never appear. For example, the instinct of burying bones shown by most dogs either does not appear, or appears only a few times if, while young, they are kept all the time on boards. It is doubtful if chickens would scratch if kept all the time on a smooth floor with no unevenness as stimulus to their feet. Certainly they will not follow unless the instinct has exercise during the first few weeks.

Although most instincts are stronger at certain ages or at certain times of the year than at others, yet most of them continue to exist in some degree during the whole life of the animal, both before their evident appearance, and after the instinctive tendency ceases to play a prominent part in the actions of the animal. Some instincts vary but little in strength all through life; yet even these may develop in quite different ways in different animals of the same species because of early experience. For example, the feeding instinct is always present, but animals and persons in certain localities get into the habit of eating certain things and no longer have an impulse to try any other kind of food when it is presented, though when young they would have taken it as readily as what they now feed upon exclusively.

The feeding instinct is specialized, yet, if very hungry and unable to get their habitual food, such animals and persons take new foods which ordinarily they would not touch.

It is evident that with all these complications, the most common and natural order of development of instincts in animals is very difficult to determine. The problem is still harder in children, who have so many instincts, most of which are during a long period easily modified by special conditions. Something, however, has been determined, as will be indicated later.

Exercises for Students

1. As a machine, how does an animal differ from other machines ?
2. Do acquired movements ever become nearly as automatic as breathing ? Illustrate.
3. Give examples of instinctive and of reflex movements.
4. Illustrate the fact that structure and instinct correspond not only in different animals, and also in the same animals at different times. How can naturalists tell the instincts of extinct animals by examining their bones ?
5. Are there any acts that you can perform better when not thinking of them ? What kind of acts are they ?
6. Why does an architect need to be more intelligent than a mason, or a squirrel more intelligent than a fish ?
7. When is a deer probably most conscious and fearful, when fleeing from danger or when cornered ?
8. Give several illustrations of learning from few experiences by animals or children as evidence of intelligence.
9. Give illustrations of the various conditions affecting the usefulness of instincts.
10. Give examples of fixed and of indefinite instincts.
11. Give illustrations of transient or periodic instincts.
12. Give some parallels between the development of the child and the race.
13. Illustrate how the instincts of individuals may be modified by accidental causes.

Suggestions for Reading

- The best chapter on instinct is in James's *Psychology*, and one of the best popular books on the subject is Chadbourne's *Instinct*. All books on animals treat on the subject.
- The following chapters bear on the nature and use of instincts: Morgan, *Animal Life and Intelligence*, chap. xi; Romanes, *Mental Evolution in Animals*, chap. xi; Wundt, *Human and Animal Psychology*, chaps. xvi and xvii; Marshall, *Instinct and Reason*, chap. iii; Baldwin, Vol. I, chap. viii; Jordan and Kellogg, *Animal Life*, chaps. xiv and xv.
- The relation of instinct to consciousness and intelligence is discussed ably in Morgan, *Animal Life and Intelligence*, chap. xii, and *Comparative Psychology*, chap. xii, and Minot, *Pop. Sci. Mo.*, Vol. LXI, pp. 289-303; Baldwin, Vol. I, pp. 208-214; Watkins, *Am. Jr. Psych.*, Vol. XI, pp. 166-180.
- The mechanism of reflex and instinctive movements are discussed by Jennings, *Am. Jr. Psych.*, Vol. X, pp. 503-515, and in Loeb's *Physiology of the Brain*.
- On the general order of development read Vincent, *The Social Mind and Education*, pp. 66-90; Swift, *Jr. Ped.*, March, 1900, pp. 295-303; Guillet, *Ped. Sem.*, Vol. VII, pp. 397-445.

CHAPTER IV

CLASSIFICATION OF INSTINCTS

BASIS OF CLASSIFICATION

IN attempting to classify instincts it is not possible to classify them according to the nature of the stimulus or the kind of movements made, or the bodily or mental states of the animals, for these are all so various that they cannot be grouped under a few heads. Again, those features are not of universal significance, since what is a useful stimulus or movement to one animal is harmful to another. Since all instincts owe their existence to their usefulness, the uses subserved by the various instincts should be the basis of classification. To a considerable extent all animals have the same general needs, hence a classification based on the *ends* gained by instinctive acts will apply to all forms of animal life, including man.

From the amoeba, which can only contract and expand, up through the paramecium, which has cilia that can move in two ways, and the duck, which may in the presence of danger shrink into hiding or use its legs in running or swimming or diving, or its wings in flying, to man, who may hide, run, swim, dive, fight, or make use of the voice in calling help or intimidating an assailant, or of artificial means of getting away, attacking,

or intimidating, we have increasing variety of means of securing what is substantially the same end, that of escaping danger. All actions, therefore, that are clearly designed for the accomplishment of the same end may properly be grouped together, though differing greatly in complexity, kind of motions involved, and nature of stimuli calling them forth. Movements about equally useful in accomplishing several ends are harder to classify, but may best be put in a group by themselves.

I. INDIVIDUALISTIC OR SELF-PRESERVATIVE INSTINCTS

All tendencies to action which have for their primary end the good of the individual belong under this head. The most fundamental and universal form of this instinct is shown in the tendency to contract the body and withdraw from unfavorable stimuli, and expand or approach toward favorable ones.

In its most primitive form the tendency to approach favorable and recede from unfavorable stimuli is found only in the tendency to move so as to increase favorable or decrease unfavorable stimuli *already being received*. For example, all animals, and even plants to some extent, move toward or away from light, heat, chemical and mechanical stimuli, so as to get more or less of them according to the nature of their organism. Even headless worms move so as to secure more of the kind of heat and light stimulations most favorable to them. It is not improbable that the migration of fish into fresh water, before spawning, is the result of activity that increases the thermal and chemical stimulation most favorable to the fish in the condition in which they are at that season of the year. The movement of a fox toward a

partridge which he scents is of this nature, though probably supplemented by conscious expectation.

Besides this tendency, which is universal in all animals, from the highest to the lowest, most animals have a tendency to move about and to react in certain ways to certain stimuli, before there is any chance to experience their favorable or unfavorable character in even a slight degree. The chief ends subserved by the individualistic instincts are the securing of food, and the avoidance or defeat of enemies. The chief forms of this instinct may be designated as the *feeding*, *fearing*, and *fighting* instincts.

The amoeba simply wraps itself around the food which it touches, while the lion stalks, kills, bites, chews, and swallows its prey. In both cases the same end is subserved. All movements made in taking, chewing, and swallowing food are examples of individualistic instincts, and the same is true of all movements used exclusively in escaping enemies by fighting, shamming death, or getting away. It is evident that means of locomotion, such as swimming, crawling, running, and flying, are useful both in obtaining food, escaping enemies, fighting, and in obtaining other ends. There is little doubt, however, that they were originally developed and are now most used in self-preservation.

II. PARENTAL INSTINCTS

If animals (except the lowest, which are without sex and multiply by division) had no instincts except those connected with self-preservation, there would be only one generation of each kind. To live as a species, animals must have instincts impelling them to produce

and care for young, as well as instincts impelling them to preserve their own lives. Not only must they have these instincts, but in most animals at certain times the parental instinct must be stronger than the individualistic instinct, so that animals with young will deny themselves food and risk their lives to feed and defend their offspring from danger, otherwise the species would not continue to exist.

In the lower animals, such as fishes and insects, which produce thousands and even millions of young, there is need only for instincts leading to fertilization and laying of eggs in favorable places; while in higher animals, such as mammals and birds, where only a few young are produced each year, and they helpless and in a complex and dangerous environment, it is necessary that parents shall have the instinct of caring for their young highly developed.

All actions, therefore, that have for their primary end the producing of young, and preparing for and taking care of them, are classed under "Parental Instincts." Hence under this head we may include, with the more obvious actions, those less directly related to the perpetuation of the species, such as singing, self-exhibition, fighting for mates, and nest building.

III. GROUP OR SOCIAL INSTINCTS

Many lower animals, such as bees and ants, always live in colonies, and have instincts that impel them to act primarily for the good of the group to which they belong, and only indirectly for the good of themselves or their species. In many instances there are in each group several different types of individuals with corre-

sponding differences in instincts. In the case of bees and ants there are nearly always three or more types in each community. Some of the higher animals, such as wolves and cattle, go in groups a part or all of the time, and coöperate in securing food and escaping danger. In so doing they act not merely for their own good and for the good of their species as represented in their young, but for the good of the group to which they belong.


This instinct is closely related to, and possibly the outgrowth of, the parental instinct. It is especially prominent in man, where the tendency is fostered by the family life resulting from the long period of infancy. Association and coöperation in family life prepare individuals for association and coöperation with other individuals not of the same family. The predominance of man over other animals is due in no small part to the greater tendency of men to arrange themselves in groups, and coöperate for the common good in attack and defence. In the history of the world those tribes and nations that have had this tendency most strongly developed are the ones that have won in the struggle for existence. The lack of this instinct is the weakness of the Chinese, who would otherwise be one of the strongest, if not the strongest, of nations.

This social instinct in man, and probably in some animals, leads not only to seeking companionship and acting with others of the species, but to desiring the approval of the group which one joins. This in man develops into pride and ambition, and may also give rise to rivalry, jealousy, embarrassment, and shame.

IV. ADAPTIVE INSTINCTS

Since all the higher animals come into the world in an unfinished state, they need to be and are very plastic to surrounding forces which develop and mould them so that they become capable of surviving and making their own living in the environment into which they are born. Mere clay-like plasticity to outside impressions, however, is not sufficient. The young animal not only adapts himself to his environment by responding to the stimuli he receives in ways most favorable to himself, but he actively seeks stimuli and repeats actions when their former stimuli are not affecting him. This inner tendency to actively increase the number of stimuli and reactions is the basis of the adaptive instincts.

Two phases of this tendency are more properly physiological laws than instincts. One is the tendency to *spontaneous* movement, *i.e.* movement without any discernible external stimulus. Such movements probably originate in the chemical changes involved in nutrition of the organism, especially the nerve centres. They begin in the embryonic stage; young chicks, for example, before hatching, make frequent movements when there is no perceptible change in the surroundings that could serve as a stimulus. These spontaneous or random movements are very numerous in early life, and hence there is greater opportunity to select and perfect such of these chance movements as prove useful. Such movements have the same place in the development of individuals that variation has in the development of the species, *i.e.* they furnish material for natural selection.



The other physiological principle is the *tendency for nervous energy to take the same course* that has just been taken. This not only favors the development of habit through the performance of the same act when the conditions are reproduced, but may, when there is a surplus of energy or a tendency to action because of some other stimulus, result in one or more repetitions of the act without the repetition of the originating stimulus. This tendency causes a child to respond in the same way to several stimuli, as answering "yes" to various questions, and to repeat a number of times any act that he performs, as saying such a syllable as "da," waving with the hand, or jumping up and down. This tendency to what Baldwin calls the "circular form of reaction," is so strong that it often seems almost impossible for children to stop with one performance of an act. Painful and unfavorable results may inhibit this tendency, and pleasure or favorable results increase it; but it does not owe its existence wholly to the results of movements. Clearly with this tendency the power of movement must develop much more rapidly than it would if a movement were repeated only when the same inner or outer conditions happened to call it forth again.

These two physiological tendencies to random movement and to repetition of movement are not, however, properly speaking, instincts; for though they favor varied and rapid development of powers, they do not favor those that are useful to the organism any more than those that are harmful. They are the basis, however, of the three following tendencies which may more properly be called instincts, — *imitation, play, and curiosity.*

Imitation may be defined in a general way as the tendency to repeat what has been perceived, especially the sounds and movements made by others of the same species. There is an outer stimulus in imitation that calls forth a movement producing to some extent the same stimulus. It is evident that this tendency is often of direct use to an animal in adapting itself to its surroundings; for the young animal that imitates his elders (which are already adapted to their environment), in seeking shelter, selecting food, and avoiding enemies, is much more likely to survive than the one who must learn what is good for him from his own chance experiences, any one of which may result fatally. The advantages to the child who has so much to learn are still greater, hence he is the most imitative of all young animals.

Play, or the tendency to perform acts for their own sake rather than for the ends to be gained by them, is of direct use to all immature animals because it gives practice in performing acts before there is any serious need for their performance, or any dangerous results from imperfect performance. It is evident that animals that play at chasing and fighting when young will have a great advantage in the struggle for existence, when they have to make their own way in life, over those that have not played in youth. Sometimes play is not distinguishable from the tendency to spontaneous movements, or the circular form of reaction, or from imitation. Playful acts are always performed for their own sake, usually prepare for future usefulness, and are the outcome of inner tendencies of development resulting from past experiences of the race.

Since playful acts are always performed for their own sake, they are always suited to the powers of the performer, neither too easy nor too difficult. This is not denying the well-known fact that plays once started are often continued too long, so as to produce extreme fatigue and exhaustion of powers. In such cases, however, as a rule, the tendencies that give zest to the game are not exhausted, though some powers needed in carrying it out are.

Play, in general, is not completely determined either by chance nutritive changes within the organism or by stimulation from the outer environment, but by the tendency to certain forms of action which have been useful to the race, and which are not being used in a serious way. Surplus energy tends to flow out along these old racial channels as fast as their beginnings are developed in the young animal. Every instinctive tendency is therefore manifested in play, and is thus perfected for future use. Surplus energy is a favorable condition for play, but what is played at any time is determined largely by the degree of development and the relative prominence of the instincts which are not needed for serious purposes.


Curiosity, unlike imitation and play, is concerned more with the securing of sensations than with modes of action. It is an intellectual hunger, an impulse to secure and test new sensations. An animal that possesses it soon comes in contact with all phases of his environment, and examines every new thing as it appears, before attempting to eat, attack, or run away from it. Under ordinary conditions this instinct helps an animal to adapt itself to its environment, and to more quickly discover dangerous or advantageous changes in its sur-

roundings. Since man has come on the scene, however, he has learned to use this instinct to the destruction of many animals, as, for example, the deer. It is quite evident, however, that under natural conditions a young animal with curiosity will become adapted to its environment much sooner than one without such an instinct. The prominence of the instinct in the rat has thus far prevented his complete destruction by the traps and poisons of man.

It is not too much to say that curiosity is the basis of all intellectual development in animals and in man. Imitation and play lead to the development of powers and the acquisition of subjective knowledge of observed acts, by causing the individual to perform them himself, while curiosity leads to objective knowledge of all kinds and is also a stimulus to the acquisition of subjective knowledge by imitation. Every new thing introduced into a familiar environment is a stimulus to curiosity, and every new relation of object or idea to other familiar ones is equally effective in man ; hence curiosity is to the intellect what appetite is to the body — a cause of growth and development.

V. REGULATIVE INSTINCTS

It is not easy to demonstrate clearly the existence of these instincts, though good general grounds for affirming their usefulness and their existence in man are easily found. Evidently, every species of animal that is to survive must conform to the laws of nature and the environment in which it lives. Every organism must conform to the laws of rhythmic, seasonal changes imposed by the sun ; hence a tendency to conform to con-



stant environing conditions, or, in other words, to act according to law, has naturally developed. Again, the several varieties of instincts often impel to opposing actions, and the tendency is for the strongest and most quickly acting instinct to determine action, although safety for the individual and species may lie in the direction of the action suggested by a more slowly acting instinct. In such cases a tendency to pause before acting and give slower instincts time to awaken and exercise their rightful influence would be of advantage. Something to make the instincts work together for the good of the animal and its species would evidently be useful.

Such an instinct probably exists, in man at least, in the *moral* tendency to conform to law and to act for the good of others as well as self, and in the *religious* tendency to regard a Higher Power. This instinct gives rise to feelings that one ought to act in conformity with certain laws fixed by the experience of the race, or by customs and habits of groups of individuals, and to a feeling of reverence and awe in the presence of the Power back of these laws.

The constancy of law in preserving uniform conditions or producing rhythmic variations tends to develop the moral instinct of obedience, while the power manifested in irregular changes in nature, as in the case of storms, tends to stimulate the beginnings of the religious emotions of awe and reverence. For these reasons, probably the people of northern countries, where seasonal variations are great, and if not conformed to, destructive, have the sense of duty much more highly developed than in tropical countries, where active conformity is

not called for to any great extent. The difference between the gods and mythologies of northern and southern peoples cannot be wholly accounted for by social heredity, but must have originated in the natural surroundings.

Since every race and tribe of people has some form of morality and worship, there is good reason for saying that the tendencies to conform to law, and to worship unknown sources of power, are instinctive; though what kind of law is obeyed, or source of power worshipped, is a matter of local surroundings and social traditions.

VI. RESULTANT AND MISCELLANEOUS INSTINCTS AND FEELINGS

Actions for the attainment of the various ends already enumerated, and numerous combinations and oppositions of ends and means of attainment, give rise to many tendencies to action and feeling that are not easily classified under any of the previously named heads. Among the most prominent of these impulses and associated feelings are: (1) the tendency to collect objects of various kinds and to enjoy their ownership; (2) the tendency to construct or destroy, and the pleasure of being a power or a cause; (3) the tendency to express mental states to others of the species, and to take pleasure in such expression; (4) the tendency to adornment, and the making of beautiful things, and the æsthetic pleasure of contemplating such objects.

A careful study of the social life of various tribes and nations of this and other ages will show that these instincts and feelings are, in every man, nearly if not quite as important sources of action as the more funda-



mental and necessary instincts, which impel to the acquisition of food, clothing, and shelter, or the means of getting them. Museums, apparatus and buildings of all kinds, languages, and works of art are in a large measure the results of these instincts in man; and there is not an individual, civilized or savage, who is not sometimes influenced more by them than by his instinctive desire for food and shelter.

Exercises for Students

1. Give illustrations of different instinctive modes of getting food, escaping danger, and fighting.
2. Describe specific instances of animals acting according to the parental instinct even in opposition to the individualistic.
3. Describe various instinctive modes of nesting by birds and insects.
4. Give illustrations of spontaneous movements, and the tendency to repeat movements that you have observed.
5. Give illustrations of each form of the adaptive instincts.
6. Give illustrations showing the need of regulative instincts.
7. State evidence for or against the view that morality and religion are instinctive.
8. Give illustrations of each of the resultant instincts named, and mention other actions that you think may be instinctive.

Suggestions for Reading

- All the books on animal psychology and instinct will furnish illustrations of the various instincts.
- A good discussion of classes of instincts is to be found in Marshall's *Instinct and Reason*, chap. v, and of their relation to the emotions in Ribot's *Psychology of the Emotions*, especially pp. 194-198 and 260-274.

CHAPTER V

THE EARLY DEVELOPMENT OF THE HUMAN INFANT

EARLY MOVEMENTS

THE human infant is a very helpless being. This is in accordance with the general law that young animals have just enough power of movement so that when their instincts are supplemented by those of their parents, they are able to live.

The *automatic* movements of independent respiration, circulation, and digestion begin as soon as the child is born.

At or soon after birth, *reflex* movements may be called forth by stimulating any of the senses, and most of these reflexes, such as closing the eye when the lid is touched, pushing out with the tongue unfavorable objects, and withdrawing a hand or foot that is painfully stimulated, are from the first, useful; while others, such as clasping with toes and fingers an object touching them, were probably at one time in the race history useful in helping the mother to carry the child.

The *instinctive* movements are very few, for human parents are prepared to do almost everything except breathe and digest for the child. Even the necessary and important instinct of sucking is sometimes not well performed at first. Usually, however, it is. A strong




infant held in a certain position and lightly touched on the cheek will, when hungry, also make movements of the head favorable to the finding of the source of nourishment. There is also in strong infants early evidence of rudimentary attempts at maintaining equilibrium of head, and a little later of body also.

The expressive mechanism for crying is well developed from the first, because this is needed to call the parents to relieve unfavorable conditions; while smiling and laughing do not appear till much later, because such movements are of little biological value.

Starting at sudden sounds, especially when they are accompanied by a jar (as the sound of the slamming of a door), is very marked. This is perhaps the first evidence of a general instinctive fear of strange and strong stimuli. A more specialized reaction which was perhaps useful in an earlier period of race history is shown in the tendency, beginning in the first month and lasting several weeks, of shrinking together and clasping as if afraid of falling, when lowered suddenly. Sometimes when clothes are removed so that there is lack of their supporting contact with most of the body, the same instinctive fear is manifested.

The tendency to bring the hands to the mouth, so prominent almost from the first, may be the result either of the habitual inter-uterine position, or of an instinct which was useful in the earlier history of the race. The tendency is certainly very helpful to the child in obtaining touch sensations, since objects are by this movement brought to the mouth for closer examination by tongue and lips.

Since ability to use the sense organs is useful to the



child, we find a partially developed reflex tendency to turn the eyes and possibly the ears into the most favorable position for use. Some weeks or months of time, and possibly some experience, are necessary before any but the first of these reflexes are perfect. Before the beginning of the second quarter, however, the eyes close at a threatened blow, move together, fixate, and follow moving objects; while a little later there is an accurate turning of the head toward the source of sound, and also a marked tendency to use the skin of lips, fingers, and toes in getting sensations of touch.

From the first, the infant makes numerous spontaneous and random movements of almost every part of the body, independently of external stimuli. These movements, resulting from organic conditions, growth changes, and the consequent outflow of energy, are important means of developing the muscles and preparing by experience for the voluntary contraction of the muscles thus exercised.

INCREASE IN COMPLEXITY OF MOVEMENT

During the first few weeks the movements of an infant seem to depend more upon general bodily conditions than upon outward stimulation of any of the special senses, and the movements of the different parts of the body seem to have little relation to each other. Soon, however, outward and special stimuli become more effective, so that crying and restless movements, due to bodily condition, may frequently be checked by auditory, tactual, or visual stimulations, such as singing, patting the child, or shaking something before his eyes.

In the second quarter, many combinations of move-

ment take place. The eyes not only turn toward and follow a moving object, but turn toward a sound or toward a portion of the body that is touched, thus bringing more than one sense into action. The lips, hands, and often the feet also, not only move when touched, but move into contact with objects seen, which are then tested by other tactile surfaces and perhaps by eye and ear. In the meantime, the first reactions against the tipping of head or body have developed so that equilibrium is maintained against the tendency of head and body to move out of balance. Not only this, but equilibrium is maintained while grasping, and head and body usually move with the hand in reaching for an object. The movements of different parts of the body are therefore no longer independent of each other, but very closely connected.

In this and the next quarter a new kind of movement becomes very prominent. Random and meaningless movements of parts change to those repeated rhythmic and partially coördinated movements of various muscle groups which we designate as play. Certain movements of limbs or vocal organs are produced over and over for several days, then a new one is practised for a while. Various combinations of movements are made, and the muscles and the senses are thus exercised and associated in countless ways, as the child amuses himself.

In the latter part of the first year not only are movements previously made, repeated in play, but movements seen and sounds heard are often playfully imitated and repeated over and over.

The process of combination goes still further, and the child begins to move toward things by crawling or other-

wise, or to stand, holding with one hand and reaching with the other, and at about a year to maintain equilibrium while standing and walking, and in getting up and down when he grasps something on the floor.

Looked at in a purely objective way, the most marked change in the movements of a child during the first year is, therefore, not in number, but in complexity, co-ordination, and definiteness. From the use of one sense and one or two groups of muscles at a time, the child has progressed to the combined use of muscles of legs, body, arms, fingers, head, and eyes, in getting objects and obtaining visual, tactual, and auditory sensations from them. The early movements were unconnected and uncoördinated, and ended in nothing but movement; while at the close of the first year they are combined and correlated with each other, and end in the changing of the position of the child or of some object. These changes toward more complex and unified movement are doubtless preparatory to, and correlated with, corresponding changes in the conscious states of the child.

EARLY MENTAL STATES

"What is the baby thinking about?" is one of the most fascinating and puzzling of questions. Sympathetic imagination endows him with a thousand adult feelings and ideas, or dimly remembered childish states. Yet no one can represent the baby's ideas except in terms of his *own* present or former mental states. The important epoch included in the first year or two of life, to which the memory of man goeth not back, cannot therefore be pictured in its true colors by the most gifted child lover.

The scientist is almost equally impotent in attempting to discover and describe the real mental states of an infant. He is perhaps strongest on the negative side; for, reasoning from general principles, he can say with considerable assurance what is *not* in the baby's mind, just as he can affirm that a planet without atmosphere has no animal life like our own, or that in a certain age in the world's history there could have been no animal life of a certain kind because it was too hot or too cold, or because there was an absence of appropriate food. When, therefore, the psychologist finds that the greater part of the cortex of the brain (which there is good reason to believe is the seat of consciousness) is not active during the first three months of life, and when he observes that nearly everything that the child does is sometimes done equally well, or even better, when asleep than when awake, and that in children born without a brain, the movements are nearly the same as in normal children, and when he remembers that the child cannot have any knowledge gained from experience that the adult has, he is warranted in saying that there is nothing in the young infant's mind sufficiently like what is in the adult's mind to warrant the use of the same terms. If he makes any positive suggestion as to the child's mental states, he will say that if there is any consciousness at first, it is most like, yet much more indefinite than, the vague feelings, almost without ideas, that are sometimes experienced by adults when in a drowsy state.

The child sleeps most of the time at first, and is probably conscious of only the more intense stimuli. The field of consciousness, soon to become a fairy land of

new experiences, is at first a half-formed, barren desert, with only an occasional rock of bodily pain or oasis of comfort clearly discernible.

Since the only key to the mind of the young child, who cannot speak for himself, by which his movements may be interpreted, is a mental state like his own at the time of making the movements, the door to his inner mental states is forever closed to adults. To us every sensation has a meaning; it is related to and calls up sensations like it or associated with it in past experience. The infant, however, has no past experience, and even when its movements are significant, the various sensations are not related to each other, but merely each to its appropriate, separate reflex. The first sound heard carries with it no suggestion of sounds of its class, or of an object to be seen or touched. It is probably only a more vivid something in the mild chaos of organic and movement sensations.

The child is at first simply a wonderful mechanism whose parts are not all finished or connected, beginning to feel and become conscious of what it does. It is distinctly conscious of only the more intense or newer things that it does, and learns how things are done only after it has done them a number of times. Consciousness probably has no influence whatever upon what is done for several months, but is merely an imperfect report of what is being done and has been done — a log book of the first voyage of the vessel of life, in which appear only the regular food watches and the unusual events of the voyage.

It is probable that there is very little unified consciousness during the first quarter; but in the second quarter,

movement or of end. The hand, however, can move in so many ways, each differing in character and difficulty, and for so many different ends, that consciousness of hand movements readily becomes intense, anticipatory, directive, effortful, selective, and hence voluntary. The acquiring of voluntary control of the hand is therefore a good type of all volitional progress. The way in which this takes place may best be indicated by notes on how my own little girl learned to grasp objects.

"*Sixty-first* day, noticed her own hand and looked at it for a number of seconds. *Seventy-third* day, put hand in her mother's mouth several times, her eyes being fixed on her mother's face, and her other hand nearly still. Her hand often went higher or lower or to one side, but the movement was successful and seemed to be called forth by the object in that position. *Eighty-first* day, held a book placed in her hands and looked at it for some time. *One hundred and eleventh* day, movements of scratching and pulling at things her hands touched became frequent, and there were some instances of reaching toward and scratching at objects, such as a magazine held before her. Also scratched at table-cloth and at a plate, and when her hand slipped off and came to her mouth, she uttered a dissatisfied grunt as if disappointed in not getting what she expected in the way of tactile sensation on the lips.

"When lying on a lounge, has often got her hand against a curtain, grasped and shaken it back and forth for a long time. *One hundred and twelfth* day, got her fingers caught in a ribbon tied around the curtain and jerked at it till it came loose, and finally got it in her mouth. Later in the day drew her father's

thumb into her mouth. He removed it, and she succeeded several times in getting hold of it and bringing it to her mouth. When not successful, gave a fretful cry, but renewed the effort. Sometimes her hand slipped over the thumb and came into her mouth, and she seemed disappointed and tried again. This seemed like a clear case of voluntary movement, though of the simplest kind, for there was probably no representation of the end to produce expectation of a certain tactile sensation and cause signs of disappointment and renewed effort when she got a different sensation.

"*One hundred and thirteenth* day, repeatedly put her father's finger in her mouth, having no difficulty in doing so after she got hold of it. She was not, however, always successful in getting hold of it, sometimes one or two fingers clasped it and sometimes all slipped past. *One hundred and fourteenth* day, reached the finger several times without trying to put it in her mouth. *One hundred and nineteenth* day, carried watch to her mouth a number of times, used both hands most of the time, sometimes merely getting them behind the watch and pushing it, at other times clasping it with one or more fingers. The arms are controlled, but the fingers show little more than the original reflex. Head usually moved toward objects before and while reaching for them.

"*One hundred and twenty-ninth* day, control of fingers not perceptibly better. She uses both hands when object is directly in front, and the nearest hand when it is on one side. Reached for watch four or five inches beyond reach, but not as certain to try as when closer. Slipped her fingers along her mother's when her own instead of her mother's fingers touched

her lips. This may have been accidentally successful, but it showed dissatisfaction in not getting the desired sensation. *One hundred and thirty-second* day, seemed to be reaching behind the mirror for the face. *One hundred and thirty-fourth* day, can move her hands with considerable accuracy and rapidity within a small space directly in front of her, and in that space generally uses both hands. When the object is on one side, she generally uses the hand on that side. Has little control in reaching up high or down low.

"*One hundred and fifty-first* day, tries to grasp nearly everything within reach, and seems to be more accurate when she does it very quickly than when she reaches slowly. *One hundred and fifty-third* day, spent some time in catching a swinging watch and letting it go. Reached for it only when it was near, and naturally was more frequently successful when it was swinging toward her than when it was swinging out. *One hundred and sixty-eighth* day, has now sufficient control of her movements so that toys give more pleasure than vexation. *One hundred and seventy-first* day, persistently reached for a red bow, though it was nearly or quite hidden from view part of the time. *One hundred and seventy-fifth* day, does not keep things in her mouth so much, and apparently shakes the rattle not simply for the movement, but also for the sound, though this is not certain. Often grasps things very quickly.

"*One hundred and eighty-second* day, can now grasp and hold in one hand a ball an inch or more in diameter. *Two hundred and second* day, has been able to take a handkerchief off her head for some time, and to-day succeeded a number of times in taking my stiff hat off her

head, having difficulty only when she took hold too far forward and pulled it against the back of her head before getting it high enough. *Two hundred and thirteenth* day, if anything is held just out of reach in front or over her head, she will try one hand awhile, then the other, then give a discontented cry and try again. *Two hundred and fourteenth* day, took hold of my mustache and drew my mouth down to hers, but drew back when she felt the prick of the mustache. This was repeated several times, but the last time she did not bring my mouth down quite close to hers. *Two hundred and fifteenth* day, pulled my mouth down toward hers, but not closer than three inches.

"*Two hundred and seventeenth* day, looked intently at a bell as she struck it repeatedly, evidently associating sight, sound, and motion. *Two hundred and thirty-fourth* day, reached with one hand, then the other, a dozen times for toys held just up out of reach before stopping to protest angrily. *Two hundred and thirty-sixth* day, reaches for tassels on her carriage, when she cannot see them, and sometimes cries when some one approaches to remove them as has been done before."

Summing up these facts, it is clear that in obtaining voluntary control of the hand in grasping, various non-voluntary movements are grouped together and repeated until they can readily be continued in various ways. These combinations are produced at first in response to the stimulus of some object which calls forth various movements, one of which has desirable results. At first the effective stimulus is some visual object, and the desired result a tactile sensation on the lips. Soon representation of the result is sufficiently

clear to produce disappointment when it is not obtained, and the attempt is repeated. The act then has the essential characteristics of a voluntary movement. This usually occurs between four and five months, while a month or two later there is shown the more complex voluntary state of representing the exciting stimulus, as well as the end to be secured, as when the child reaches for what is not in sight. At about the same time the end to be gained is often changed to tactile sensations on the hand instead of on the lips, or to muscular sensations as the hand is moved, or auditory sensations as the object is made to strike something else. When a movement is stopped because the consequence has proved disagreeable (as when the mustache was brought to the lips), we have a further complication of desired movement and undesirable consequence.

The muscles first brought under control are the larger ones of the whole arm, while the space in which control is first exercised is directly in front and near the level of the mouth.

Other movements than those of the hand come under voluntary control in a similar way; first the eyes and head in turning toward sights and sounds, then the body in sitting, then the hands in grasping, and finally near the close of the first year, the legs in creeping, standing, and walking, and the vocal organs in repeating sounds. The first of these is so largely provided for by inherited mechanisms that the movements soon come under the possible control of consciousness, while the last involves the coördination of so many simpler non-voluntary movements that the whole series is often looked upon as acquired by experience.

LEARNING TO WALK

The tendency to locomotion, though primarily developed in the race as a means of nutrition and escape, is fostered in the individual child more by the instinct of curiosity or the desire for the sensations to be obtained by coming in contact with various objects than by the desire for food and escape.

The fact that children are a long while learning to walk, and that various movements such as rolling, crawling on stomach, or on hands and feet, hitching along in some form of sitting position, pushing one's self backward, or rapid running from one support to another, may be used as means of approaching objects, before the child attempts ordinary walking, seems to indicate that there is in human beings no instinctive mechanism for walking as there is in the case of chickens or pigs, which can walk almost perfectly from the first.

On the other hand, the fact that the walking reflex (the tendency to move one foot forward when the other touches the floor) develops in the first or second quarter, and that the rudimentary tendency to maintain equilibrium appears even earlier, shows that part of the mechanism of walking is in working order at an early date. Walking becomes possible when its reflex elements can be properly combined. Such an instance as the following shows that the whole mechanism for walking may be developed and its parts connected without experience, and that consciousness hinders rather than helps, all of which indicates that walking in children is more instinctive than is usually supposed.

The instance is thus described by the father, Superintendent Hall of North Adams, Mass.

"In reply to yours of March 25th, I give you the following account of how my little daughter Katherine learned to walk. She was the youngest of a family of five. The other children had learned to walk soon after they were a year old, and in the normal fashion — by being encouraged to put forth a series of efforts until they were able to go alone. Katherine was a normal child in other respects, bright, active, and healthy, yet unable to walk a step when she was seventeen months old. Of course we were anxious, fearing the cause of this inefficiency might be physical, especially as she persisted in crawling and absolutely refused to try to help herself under the encouragement of any assistance.

"At last we referred the matter to a physician who said: 'It is a peculiar case, and I can hardly tell whether the difficulty is physical or mental. If there is no improvement in a short time, call me again.' Shortly afterward I came home one day at noon, and placing my cuffs on a table in the sitting room threw myself on a lounge to rest. Katherine happened to notice the cuffs from where she sat on the floor, and crawling across the room pulled herself up by one leg of the table, and reaching out with one hand, while she held on to the table with the other, took a cuff off from the table and slipped it on over her wrist. Of course to do this she had to stand alone. I noticed it at once and was surprised when she reached out her other hand for the other cuff and slipped that on, and then stood looking in a very interested way at the cuffs on both wrists. Then, to our great surprise, she turned toward me with

a very pleased expression on her face and walked as confidently and easily as any child could. Not only this, but she immediately ran across the room, through another room, and around through the hallway, not simply walking, but running as rapidly as a child four or five years of age would. What surprised us most was that she did not seem to be wearied by her effort at all.

"We allowed her to keep the cuffs on for ten minutes or more, and she was on her feet all the time. At last she sat down a moment, rested, and then, strange to say, got up on both feet without assistance, and commenced to run around the room again. As an experiment I took the cuffs off, and she was as unwilling to try to walk as before. We could not possibly induce her to take a single step without the cuffs. When, however, we allowed her to put them on, she seemed to be greatly delighted and walked and ran as before. The result was that I gave her an old pair of cuffs and allowed her to wear them for two days. This was the only way we could keep her from crawling. After that time she seemed to be able to get along without the cuffs, and has not crawled any since."

Since publishing this account other similar cases have been reported to me.

MODES OF LEARNING

The child comes into the world not only with reflex and instinctive tendencies to special movements, but also to general movements. This is shown in the tendency to spontaneously exercise all of his muscles. He also tends to move every part of the body in response

to any strong stimulus. Young babies twist and turn and call into action nearly all of their muscles. When a little older, a bright object causes them to throw up hands, feet, and head, and perhaps to quiver with fear or spring up and down in delight.

A large proportion of these general or spontaneous movements are useless, but some of them, especially when combined with the special instinctive or reflex movements, secure favorable results. Such movements, according to a fundamental principle of organic life, are selected (not necessarily consciously, but inevitably as the plant grows toward the light) for repetition. For example, a little girl who threw up her feet in disgust when the milk ceased to flow, happened to tip the bottle so that it flowed. This was repeated several times; after that for several months she used her leg to hold the bottle. Later the hand was found to be more convenient for the purpose, and the habit was dropped. In similar ways mechanisms for securing various ends are developed, and the will thus soon has a chance to choose ends or means of attainment, or both.

In spite of the fact that mechanisms for obtaining many ends are thus developed, the child does not know how to use them, and must learn how. He usually needs also to effect some modification, refinement, or new connection of mechanisms of movement in order to gain his conscious ends in the new situations which he constantly meets. He may have clearly in mind the end of getting a red ball suspended near him; but if it is up high, or far to one side, he may miss it a number of times before he succeeds in getting hold of

it. With further experience he can reach it accurately the first time. If, however, the ball is placed beyond his reach, he must keep trying till he finds some mode of approaching it, such as rolling or creeping toward it.

In all such instances the marked feature of the child's attempts is the large number of useless and inaccurate movements made before success is attained and expertness gained. It is, therefore, very properly called the "trial and success method" of learning. The first success being determined largely by chance, the more movements that are made the sooner is the right one likely to occur.

Of course the dice are always loaded to some extent by inheritance and acquired coordinations of sensations and movements, hence success is attained much sooner than it would be if it were a matter of *pure chance* as to which of the more than four hundred muscles should contract, and in what order and degree.

Another way by which mechanisms for obtaining ends are developed is by *imitation*. When a child sees an interesting movement or hears an interesting sound, he has not only a tendency to move all his muscles, but a stronger special tendency to move the muscles necessary to reproduce the perceived movement or sound. In this way he soon perfects the mechanism for making many movements that are useful to others, and which will be useful to him some day. Some children early learn all the sounds of the language in this way, later using the ability thus acquired in uttering words as a means of expressing their wants.

In a large number of instances the child sees others getting what he wishes to get, and by observing their

movements his own are modified in the direction of the movements necessary to success. Imitation is therefore especially valuable in complex acts involving the use of several mechanisms which have never been used together in the required way. Almost all kinds of games and occupations may be learned by this method.

There is still another and higher method of learning—that of learning by means of the *understanding* or reason. In its simplest form this means of learning merely supplements the other methods. By the “trial and success method,” for example, a young and active cat gets the door of its cage open sooner than an older and less active one; but the older cat drops useless movements much quicker in subsequent experience, and therefore sooner learns to open the cage by the one necessary movement. In the older cat conscious intelligence probably aids in selecting and “stamping in” the right movement. In a similar way the process of learning by imitation may be hastened by conscious selection of the portions of an act necessary to success, and the proper modification of them to suit the powers of the learner. In its higher forms the understanding may be used in learning to do entirely new things, by selecting from various observations and past experiences the elementary acts required, and combining them in the proper way. This mode of learning is in its highest manifestations really a kind of discovery, invention, or reasoning.

These three methods of learning are used by both adults and children whenever ends are to be gained by new means. The “trial and success method” is especially useful in perfecting the simpler mechanisms of

actions, the "imitation method," in learning the simpler processes, or, in other words, in connecting elementary movements with each other; while the method of "understanding or reasoning" is best in learning to perform complex acts or in coördinating several processes for the accomplishment of one end. In learning to touch a point accurately the "trial and success method" is best, in learning to knit, the "imitation method," and in learning to play chess, the "understanding method," though each method may be supplemented by one or both of the other methods.

Animals and young babies learn almost wholly by the "trial and success method," and by unconscious imitation, young children by more or less conscious imitation, and adults by understanding. This is partly because the things children are learning are, as a rule, of a different kind from those that adults are learning, and partly because the adult's mind is better suited to learning by means of ideas. It is absurd to have adults try to learn acts of manual skill, such as bicycle riding, by the method of understanding, and simply outrageous to depend upon such methods in teaching children to write and draw.

Conscious knowledge of the exact movements involved in complex acts is of less significance than is usually thought. It is generally recognized that there is little or no consciousness of the details of familiar acts like walking, writing, catching a ball, etc., but it is usually supposed that we had to become conscious of all the details when we learned the movements. This is a mistake, however, for many things are learned with little or no consciousness of the elementary movements

involved. This is especially true of movements learned when young. All movements largely reflex and instinctive in character, and most of the elements of movements gained by the "trial and success method" and by imitation have never been known as means to ends, except when more than one way of gaining an end is suggested at the same time. Children, and even adults, are often checked rather than aided in their efforts to gain an end, by attempting to teach them exactly what motions they must make in order to succeed. In general, *conscious* knowledge and understanding have been given too prominent a place in the early stages of manual training, especially in the case of children.

RELATION OF INSTINCTS TO MENTAL ACTIVITIES

The chief difference between a man and a photographic plate is that man has active instincts which impel him to do something else besides receive and reproduce impressions. Of course he responds to a much greater variety of stimuli; but the chief point is that he is not passive, but reaches out into the world for stimuli and responds to them in many self-determinate ways.

The chief differences in a human being at different stages of development are due not merely to experience, but to different instincts which are present or prominent at different periods of life.

As we have already seen, impulsive movements are the basis of voluntary control, since by no possibility can the mind know how to make a motion or what will be the result until the motion has been made and the result experienced. The different ways in which a child responds to the various stimuli that he receives are

important means of distinguishing one sensation from another, and the chief means of associating them in certain ways, hence our intellectual life is based ultimately upon our reflex and instinctive movements. The emotions of a child also depend upon the ways in which he reacts to various objects, the modes of expression used, and the internal bodily changes that occur. His emotions are therefore largely the consciousness of his own reactions to his surroundings. It is just as impossible to experience an emotion previous to its corresponding instinctive reaction as it is to voluntarily make a particular movement that has never before been made. Nothing surprises us so much as new emotions that suddenly come into our lives, as novelists have often shown in one sphere of instinctive development.

In the higher forms of action, involving not merely control of movement but complex ideas and feelings, emotions seem to be the conscious determinants of action. It is really instinct and habits, however, that determine what feelings shall be experienced under present conditions and that render possible the picturing of the feelings that may be experienced through the proposed actions.

Our whole mental life, intellectual, emotional, and volitional, is developed from our instincts. All activities of conscious life have for their root, unconscious, blind, instinctive tendencies. The silking of growing corn is not more entirely determined by the laws of organic development than is the emotion of love in the youth, by the emergence of a new instinct from the depths of his unconscious nature.

In our further study of instincts and their develop-

ment, therefore, we are really studying the fundamental yet unrecognized basis of all intellectual, emotional, and volitional development.

Exercises for Students

1. Report observations or printed records of the early reflex and instinctive movements of infants.
2. Describe instances of an infant of less than a year, using many parts of the body in a coördinate way for a single end.
3. Mention several specific movements of an infant less than six months old, and give reasons for thinking them either unconscious, conscious, or voluntary.
4. Report early instances of volition observed by yourself or found in reading.
5. Report from observation, hearsay, or reading as fully as you can how one child learned to walk.
6. Report from observation or reading, instances of animals learning by the "trial and success method."
7. Give illustrations of the three methods of learning in the case of persons. Name two or three things that may best be learned by the "trial and success method," by the "imitation method," and by the "method of understanding," indicating in each case whether the age of the person makes any difference as to the prominence of the preferred method.
8. By which method should children learn to sing ?
9. May we expect a child to know how to control a new feeling ? Why ?
10. Should we strive to control a child's actions by his feelings or his feelings by his actions ? Why ?
11. Is it better to do a kind act for a child or let him do one for you ? Why ?

Suggestions for Reading

On the general subject of infant development, read Preyer, Moore, Shinn, Tracy, Compayre, Vol. I, and the following articles: G. S. Hall, *Ped. Sem.*, Vol. I, pp. 127-138; Mrs. W. S. Hall, *Ch. S. Mo.*, Vol. II, pp. 330-342, 458-473, 522-537, 586-608; Darwin, *Pop. Sci. Mo.*, Vol. LVII, pp. 197-205.

- On the development of voluntary control and learning to walk, see Spence, *Pop. Sci. Mo.*, Vol. XIII, p. 444; Kirkpatrick, *Psych. Rev.*, Vol. VI, pp. 275-281; Baldwin, *Science*, Vol. XVII, p. 113, or *Pop. Sci. Mo.*, Vol. XLIV, p. 606, and *Science*, Vol. XXII, p. 286, or *Mental Development*, Vol. I, pp. 47-103, 367-430; Dexter, *Ed. Rev.*, Vol. XXIII, pp. 81-91; Judd, *Genetic Psychology*, chap. vi; Trettein, *Am. Jr. Psych.*, Vol. XII, pp. 1-57; Compayre, Vol. II, chap. iv.
- On methods of learning, see Thorndike, *Human Nature Club*, chap. iii, or *Pop. Sci. Mo.*, Vol. LV, pp. 480-490.
- On relation of instincts and emotions, see James, *Psychology*, chapter on "Emotions," and Ribot, *Psychology of the Emotions*, chap. vii; Baldwin, Vol. II, pp. 185-220.

CHAPTER VI

DEVELOPMENT OF THE INDIVIDUALISTIC INSTINCT

STRENGTH OF THE INSTINCT

THE usages of polite society all tend to suppress and cover up this instinct, but it remains as a powerful underlying force, directing the feelings, thoughts, and actions of men and women. In times of excitement it bursts into view in a most surprising way. In a moment, a company of courteous ladies and gentlemen, apparently intent only on giving each other pleasure, may be transformed into a pack of wild beasts, struggling and trampling under foot their helpless companions in the effort to escape from a burning building.

Even when reflective consciousness has attained to the view that life is not worth living, and decides upon suicide, a sudden change in conditions will arouse the all-powerful instinct to live, and the individual then struggles for life as frantically as if it were the most desirable of all things. For example, a Frenchman who was on his way to drown himself, promptly climbed a lamp post and clung to it with desperate energy when death appeared in the form of a tiger escaped from his cage. In a similar way, a young lady wading into Lake Michigan to drown herself avoided destruction by running to shore when threatened with being shot if she did not do so. Each had suppressed in

one form only the instinctive tendency to avoid death, hence impending destruction in another form produced the usual instinctive reaction.

So strong is the self-preservative instinct that few sane persons commit suicide. It is also very difficult for any one to voluntarily injure himself. Considerable determination is necessary to prick one's own finger in order to get blood for examination under a microscope. It is also almost impossible to refrain from instinctive movements when injury seems to be threatened. The man who offered a prize to any one who would hold his finger against a glass without flinching, while a rattle-snake struck at it from the other side was quite safe in doing so. In all sudden emergencies, where blind instinct rather than reason controls, action is nearly always governed by the individualistic instinct.

In deliberate action other instincts may temporarily attain ascendancy in consciousness, yet none of them, as a rule, maintain their prominence for long periods of time. Many coöperative and communistic experiments have failed because they were opposed to the all-powerful individualistic instincts. Coöperative institutions, which appeal to other instincts and to the individualistic also without opposing the one to the other, are, on the other hand, grand successes.


PROMINENCE IN THE YOUNG

The instinct of self-preservation is not only the oldest instinct, but one that has been most uniformly useful to all species from the earliest beginnings of animal life, hence we should expect it to be strong in the young child. There is, however, a still more important reason

for expecting it to be strong in the young of all animals, including man, viz. because it is the only instinct that can be of any use in this stage of early helplessness. Any tendency on the part of a young animal or child to act for the good of any other being than itself would be futile, and in many cases injurious to itself and indirectly to its species, hence the individualistic instinct *must* be dominant in the young of all species that survive.

The dominance of this instinct in the child is due, not so much to its greater intensity in childhood as to the fact that he has neither the power nor the tendency to use any other instinct (except the social and adaptive, and these only for his own advantage). When older, other instincts develop in a form that make it possible to act for the good of others. The individualistic instinct is then less prominent because it is no longer the *only* source of action. It is doubtful, however, whether the individualistic tendency is really decreased very much in adults, though its influence is partially counteracted by other instincts and by training.

The child needs not only to act for his own good, but to act so as to make his necessities and desires known to his parents that they may be supplied, hence the instinctive and acquired powers of expression are made to take the place of powers not yet developed. Activity in forcing his wants upon the attention of adults is more helpful to him in securing the means of subsistence, safety, and development than activity on his own account in trying to get them. The child is, therefore, a natural and persistent beggar. He not only makes his wants known and forces them continually upon the



attention of parents till his desires are satisfied, but often seems to assume command over his elders as his servants, and to demand of them what he wants. This tendency is natural and unmoral, not immoral; but both for the child's own good and that of his elders, it needs to be kept within bounds and directed. Even mother birds, cows, and dogs find it necessary, as their little ones grow up and become able to care for themselves, to refuse their demands and perhaps drive them away to look out for themselves. In a similar way parents should continue to do things for a child only so long as he is unable to do them for himself. Even before that, social training should be begun by requiring him to indicate his wants quietly and politely.

DEVELOPMENT OF INDIVIDUALISTIC INSTINCTS INTO MOTIVES

The individualistic instincts, like all others, are at first blind. All the child's early movements are for his own well-being, hence the ideas, emotions, and volitions that develop from these movements are concerned with obtaining desirable things for self, though he has, as yet, no clear idea of self.

In the second and third year, when the adaptive instincts and the lower forms of the social instinct are very prominent, and the self is only partially distinguished in consciousness from others, whose acts and mental states are so frequently reflected in the child himself, action is less directly individualistic. The child does and feels as others around him, and sometimes seems equally well pleased whether he or some one else gets

or does a thing, though in other instances he is very strenuous about being the one to do, taste, see, etc.

In the fourth and fifth years, when the child has become more of a self-conscious being, he looks ahead to the favorable or unfavorable results of actions, and recognizes the fact that favorable results to another often mean that they shall not come to him. The charming appearance of unselfishness in desiring others to eat, see, hear, etc., then disappears, and he, as a matter of course, tries to get all good things for himself. Reflex sympathy, and the desire for approval, influence his motives and actions; but usually he tends to choose consciously that which will bring pleasure to himself, regardless of how it will affect others (except as their pain is reflected back upon himself). Sometimes he schemes to both gratify selfish impulses and to secure social approval, as did a little girl who had been taught to take the smaller piece, when she insisted on giving her brother his choice of two parts of an apple, instead of taking her choice first.

In general, the question which the child mentally asks of every object and every person is, "What are they good for?" meaning by "good," "What can I get out of them?" He is the centre of the universe, and everything and everybody is for his pleasure. Persons, as well as things, are valued in proportion to the amount of pleasure he can get from them.

The first few years of school life are preëminently the period of selfness or individualism. The chief motive in life is to get everything possible for himself, — objects, sensations, knowledge, privileges, and honors. It is the period in which individual rivalry is least checked by

altruistic impulses. The interests of the child's family and special friends are looked after, largely because they are his. The prowess of a big brother, or the possessions of a father, or the goodness of a friend, are merely a part of the young monarch's treasures, to be exhibited to those outside of his dominion. Their interests are to be advanced as a means of self-enlargement. If, however, their advantage should conflict with his, they at once become of secondary importance. Every new acquisition of possessions, friends, knowledge, experience, and power is enjoyed as an enlargement of the kingdom of self.

To be thoughtful of the interests of others, or to be interested in anything not concerned with the advancement of this kingdom of his, would be to be something other than a healthy, normal child. He cares as little for things outside of his domain as did the people of ancient nations. The way in which the child mind relates everything to self is beautifully shown by asking children to give sentences containing such common words as cat, house, book, and noticing what a large proportion of the sentences bring self in (*e.g.* "*My* cat is white," "*My* uncle has a bull dog," "This is *my* book") as compared with corresponding sentences written by older children or adults.

INDIVIDUALISM THE BASIS OF HIGHER DEVELOPMENT

The extreme egoism or selfness of a child from six to ten is not to be deprecated (though it may need some mitigation) for it is an important and valuable phase of development. The usefulness of any individual depends upon what he is, the knowledge and power that he pos-

sesses, and the use he makes of them. It is therefore necessary that the first law of life should be one impelling to self-enlargement and development. If the law of service to others were the dominant one in early life, there would never be a self capable of efficient service. It is fortunate, therefore, that no training can entirely suppress or overshadow the individualistic instincts in early life, otherwise many children would soon be so good they would be good for nothing as men and women.

Modesty is undoubtedly a most admirable thing in a man, especially one who has already developed a great personality, but it is very disadvantageous in a child. The more pride and ambition a child has, so long as it is connected with active effort rather than passive enjoyment, the better for his future development. If praise and reward prompt to fresh effort (within the limits of his strength), a child can scarcely have too much recognition of his achievements. What would be insufferable egotism in an adult is perfectly proper in the child. If the child has companions who are his equals, and is held to standards of attainment which require his best efforts, he may be freely encouraged in the belief that he is accomplishing wonders.

Every parent and teacher should frankly recognize that the all-powerful motive to the child is gain to self. The gain to self may take the more refined forms of securing the approbation of others or of demonstrating his power to do things for them; but it must contribute in some way to the enlargement of the child's self, in the minds of others and to his own consciousness.

Intelligent training, either for good or evil, will be

based on the individualistic instinct. If it is good training, it will lead the child to discover that he can get the most for himself in the long run by being kind and helpful to others, because of the return favors, rewards, and approbation thus gained. If the training is bad, it will lead the child to the belief that he gets the most when he disregards others, and gets all he can for self. The worst possible training is the fond and foolish kind which appeals to unselfish motives (without success, of course), inflicts no punishment, and guards from the natural consequences of acts.¹ A parent who guards a child from the natural results of his wrong acts, and a teacher who makes many rules that only the good children take the trouble to obey, while the bad ones enjoy the forbidden privileges, form the worst conceivable combination, especially if the child has no chance to play with children of his own age. The rough companionship of the playground without any attempt at control by parent or teacher would be much better. If he strikes another child, he gets a blow in return which teaches him that such actions are not profitable; while if he strikes a fond parent he gets no blow, and by a little crying in addition he may get some jam.

Even sympathy, gratitude, and all the higher virtues are based on regard for self. Only one who has experienced an unpleasant mental state and felt a strong desire to be freed from it, can appreciate such mental states in others and experience gratitude for relief. The golden rule is of most significance to him who cares most for himself.

¹ For illustration, see Tanner, *Journal of Childhood and Adolescence*, Vol. II, pp. 91-99, 229-246.


THE FEEDING INSTINCT

This is one of the three most distinct forms of the individualistic instinct and one of the first to be manifested. Physically, the feeding instinct is the essential one in early childhood, but mentally it is of no great importance. The apparatus for satisfying the instinct is so nearly perfect at birth, and the sensations given by the first food—milk—are so mild, that the act of nursing produces little consciousness. When the instinct is not satisfied, the sensations arising from hunger and from the act of crying are, however, probably among the first vivid conscious experiences of the child. The sense of taste proper plays a small part in the mental life of the child during the first two years. His curiosity, playfulness, and interest are much more readily excited by tactile, visual, and auditory stimuli than by taste proper. The pangs of hunger rather than the pleasure of satisfaction are what render the feeding instinct prominent in early life.

Variety in food develops the instinct of eating in a positive way, so that by the time a child is three or four years old sensations of taste occupy a prominent place in his consciousness. This continues for several years, and there is probably no time in life when gustatory pleasures and pains are more intense than at five or six years of age. To be able to gratify the desire for agreeable food and avoid disagreeable tastes is at this time one of the chief motives in life.

FEAR

Next to feeding, the most fundamental instinct is that of escaping or avoiding danger, or *fear*. To be more



exact, fear is the *emotion* experienced when such actions are performed, and especially when they are interfered with. Starting at loud sounds is one of its earliest manifestations in children. Another early and striking evidence of this instinct is shown in the fear of falling that appears between one or two months, and lasts only a few weeks. This form of the instinct may never become conscious, since it dies out so quickly. The fear of falling, a number of months later, is largely the result of experience.

The modes of manifesting fear are various, such as running, hiding, screaming, keeping silence, changing color, etc., but they are all largely instinctive, and at one time in race history, were connected with self-preservative actions.

All new, sudden, and strong stimuli are likely to call into action the fear expressing apparatus. Sounds are more frequent causes of fear than sights, probably because such stimulation may be more strong or sudden. Aside from strength, suddenness, and newness it is doubtful whether the one kind of object is in itself more fear-exciting than another. The dangers to young animals are so various that it is doubtful if any one kind of danger could have developed a specific kind of fear such as fear of hawks by chickens, of cats by mice, or of snakes by children. The important thing for a young animal is that he shall respond as his parents do to new stimuli, or if they are not present, that he hide or get away from possible danger. The chicken crouches when a hawk appears because its mother crouches and gives the danger signal, or if alone, because a sailing bird like a hawk is a new

object. The mouse avoids the cat because its mother does, or as it avoids all moving things that are new to it. The child fears a snake because of the shudders, exclamations, and stories of adults, or possibly because of the strange form and movements of the reptile.

Probably the only specialized fear that is instinctive is that excited by the danger call of parents. If there is any other it is fear of darkness, but that is a *condition* in which fear may readily be excited rather than a specific *object* of fear. All animals and persons are more easily frightened in strange surroundings as well as by strange objects. Darkness makes the surroundings strange and unknown, hence in darkness fear is readily excited.

In the case of children in the dark no external object is necessary to excite fear; imaginary objects are sufficient. Unless children have been accustomed to a light, they never become frightened at the dark until their imagination develops. When a child is capable of picturing events, the recall of any fearful experience while in the dark where the eyes do not contradict the imagining is sufficient to excite fear. Thus a little girl about two, who had been told the story of the "Three Bears," with realistic imitations of the large bear, suddenly developed fear of being left in the dark.

After a child has once experienced fear in the dark, he has a tendency to fear whenever left in the dark. His imagination makes various vague or vivid pictures, and often the more vague and indefinite the picture, the greater the fear, for it has the element of strangeness and he has no means of demonstrating that it has not objective reality. Where some definite visual

object is feared, especially if it is something new, the fear may often be allayed by bringing a light and showing what it is, or that nothing is really there.

There are few children who do not, for a considerable time, suffer tortures in the dark, often without the knowledge of their parents. An unsympathetic or ridiculing adult does not invite confidence, hence even if the child's fears are of sufficiently definite things to be expressed (as they are not usually), he does not make many attempts to explain. He often either suffers in silence with head covered or finds all sorts of excuses for getting adults to come to his room or strike a light in it.

The period of greatest fear, though it varies with special experiences, is usually at about three or four years of age. No matter how careful parents may be about having their children frightened by stories or otherwise, they usually become at this time virtually little "'fraid cats." Biologically, this is the time when they begin to act for themselves to some extent away from parents, and consequently the time at which readiness to become frightened and run home would be most useful. Psychologically, it is a time when the imagination is very active, and when its action is not limited by any fixed laws of possibility or probability. Children, however, who are unimaginative, or who are fortunate enough to escape fearful experiences, are often at this time literally without fear. Never having experienced it they do not know what it is. A single experience, however, in which the child is really frightened (not merely hurt), may transform him into an arrant coward.

Fear should be and usually is a waning instinct, yet

one that never entirely dies out. As the child becomes better able to take care of himself, and more familiar with his surroundings, fear in the sense of a sudden and strong emotion becomes less, though perhaps fear in the sense of caution or prudence is increasing. With progress in civilization, and knowledge which makes the conditions of life safer, and leads more and more to the belief that even the unknown is governed by known laws, fear should gradually die out.

Undoubtedly, there is less fear than formerly, but many people suffer all their lives from fears which are usually quite unreasonable. Some of these fears of natural forces and forms, such as thunder, fire, water, caves, reptiles, and insects, may be survivals from more primitive conditions of life ; but they are probably merely transmitted from one generation to another by social heredity. Others of them, such as of guns, engines, knives, etc., cannot possibly be instinctive.

Fear in the sense of prudence, which leads one to avoid what is likely to bring unpleasant results, or in the sense of caution in regard to incurring unknown consequences, is a good thing ; but fear, in the sense of a sudden, strong, paralyzing emotion, is injurious physically, stupefying mentally, and degenerative morally. It makes one's life miserable, weak, unworthy. Every effort should therefore be made to eradicate it. Fear is so powerful an instinct in children that by means of it they may be made to do almost anything. It should not, however, be used as a motive except in the milder forms, which develop prudence and caution rather than terror.

As to modes of dealing with the fear of children, a

few general principles only are clear. (1) Occasions of fear should be avoided as far as possible, and when it is excited, reassurance given as quickly as possible. To compel children to endure terrors is decidedly cruel, and utterly useless as a corrective. If their fears can be allayed by temporarily bringing a light or otherwise removing the cause of fear, or if the child can be induced to be "brave" and face it himself, much is gained. (2) Unreasonable fears, which are the most common and least dependent upon experience, cannot, as a rule, be dissipated by reasoning; but one can only trust to quieting assurances, time, and experience, and the growth of courage and self-control, to effect a cure.

Fears caused by unfortunate first experiences with a class of objects may usually be dissipated by reasoning and favorable experiences. The quicker such cure can be applied, the better. For example, a two-year-old boy was frightened by a thunder-storm; but at his first call, suggesting rising terror, his father went to him and talked to him, comparing it to the lighting of great matches, and remained with him awhile, admiring the beauty of the storm. The result was that he never afterward showed fear of a thunder-storm.

THE FIGHTING INSTINCT

The fighting instinct and its accompanying emotion, anger, are early aroused by anything interfering with the child's activities or wishes. It is first manifested by crying, turning away the head, pushing away an offending object, and later in kicking and striking, and not infrequently by stamping with the feet or striking the head against the floor.

In general, this emotion is more intense and easily aroused in children than in adults, but also very much shorter lived. Within a space of less than half a minute a boy of two fondly stroked his mother, then jumped from her lap in anger when she refused to let him do something, then burst out laughing at something he saw.

In dealing with this emotion care should be taken to avoid occasions of anger, especially when the child is hungry or otherwise in an irritable mood, and equal care taken that he gains nothing by his outburst, but rather loses something. Under no circumstance should the parent or teacher meet anger with anger, for nothing will more surely make the matter worse. Indifference, isolation, or a calm resistance that makes the child realize the utter uselessness of his passion are usually more effective. The reaction following a futile outburst of anger is likely to arouse reflections that lead to future efforts at self-control.

As to the fighting instinct, and the much mooted question whether boys should be allowed to fight, it may be said that the instinct is a natural and legitimate one if not carried to excess. A boy with no tendency to fight under any circumstance, or with the tendency under full control, would be a monstrosity as a child, and a nonentity as a man. Nothing can be more unwise than to tell a child he *must never* fight. It is not only unwise but wrong to absolutely prohibit a child from fighting—wrong to his nature, and to that of other boys, who will thus be tempted to impose upon him. Fighting is a crude form of social action adapted to the early stage of human development, and usually results in valuable lessons.

On the other hand, as a rule, the tendency to fight needs no encouragement. The best corrective for extreme pugnacity is, however, an encounter with a superior in the art, rather than the words or blows of some one in authority.

Competition is a form of fighting that is very prominent all through life. The tendency to individual competition is very strong the first half-dozen years of school life and may very properly be utilized in school. Care should be taken to make it fair to all, and after a time it should take the form of competition of groups rather than of individuals.

Exercises for Students

1. Give illustrations of the strength of individualistic instincts in adults.
2. Give proof showing the uselessness to the species of any other than individualistic acts by children.
3. Give a number of observations you have made, showing how children are governed by individualistic motives.
4. It will be well to make the experiment of having children and adults write sentences containing common words, and note to what extent self is brought in.
5. Two children of four and six, who went to buy a present for baby sister and for grandma, could hardly be prevented from buying things that neither baby nor grandma could use, though attractive to children of their own age. Why was this ?
6. Mention a number of ways of using rivalry in school.
7. Women are more personal in their relations than men, they are also better primary teachers. Is there any relation between these two qualities ?
8. Which should a teacher praise, perfectness of results or individual effort and achievement ? Why ?
9. Which would you rather have, a child with too much or too little regard for and confidence in self ? Why ?

10. Illustrate how a child may be led to see that he can get more pleasure by obedience and kindness than by the opposite.
11. A little girl who had often been reproved for not persisting in her tasks, showed a great deal of gratitude when her father worked a long while to make something for her. Why was this ?
12. Give illustrations of sympathy and gratitude of children.
13. Report observations or reminiscences of the prominence of the desire in children for good things to eat.
14. Give a full report of your own fears at different ages, also report observations that you have made.
15. Give evidence for and against the view that there are special instinctive fears.
16. Illustrate the importance of first experiences in giving rise to fears.
17. Show how caution may be developed without exciting fear.
18. Report from observation and reading, modes of treating anger.
19. Discuss evils and advantages of fighting among boys.

Suggestions for Reading

- On the instinct of self-preservation, see Drummond, *Ascent of Man*, chap. vi, and Ribot, *Psychology of Emotions*, pp. 199-206, and on egoism and altruism, consult psychologies, especially Hoefding.
- On the early emotions and their expression, see Compayre, Vol. I, chap. v ; also Preyer, Tracy, *et al.*
- On fear, read Ribot, pp. 207-217 ; Hall, *Am. Jr. Psych.*, Vol. VIII, pp. 147-249 ; Stanley, *Psych. Rev.*, Vol. I, pp. 241-256 ; *Am. Jr. Psych.*, Vol. IX, pp. 418-419 ; Barnes, *Studies in Ed.*, Vol. I, pp. 18-21 ; Calkins, *Ped. Sem.*, Vol. III, pp. 319-323 ; Sitwer, *Kg. Mag.*, Vol. XII, pp. 82-87 ; Tracy, pp. 44-47 ; Preyer, Part I, pp. 164-172 ; Sully, *Studies in Childhood*, chap. vi ; Rowe, *Outlook*, Sept. 2, 1898, p. 232.
- On anger, read Hall, *Am. Jr. Psych.*, Vol. X, pp. 516-591 ; Ribot, pp. 218-229 ; Tracy, pp. 47-49.

CHAPTER VII

THE DEVELOPMENT OF THE PARENTAL AND THE SOCIAL INSTINCTS

I. THE PARENTAL INSTINCT

LATENESS OF DEVELOPMENT

THE term parental instinct includes all native tendencies to produce and care for the young. Since sexual reproduction is the rule in all animal life except possibly in a very few of the lowest forms; and since it has been necessary among all species that have survived, it might be supposed that the parental instinct would appear in man at a very early age. This instinct, however, does not, as a rule, appear with any prominence until more than a dozen years after birth; hence primitiveness and universal usefulness cannot, in this case at least, be the most important factors governing the order of the development of instincts in the individual. Evidently the principle of usefulness, as determined by *degree of maturity* of the young animal, and the conditions under which he must live, is the factor of greatest significance here.

All physical and mental tests show that the differences between boys and girls are slight up to ten years of age. Sexual feelings are probably experienced before this only in abnormal children. As a rule, boys

and girls exercise very little sexual influence upon each other until just before puberty, though there are of course many exceptions. Most of the little "love affairs" between small boys and girls are not greatly different from the chumming of those of the same sex.

At puberty, however, there is a change. At first it is manifested in a slight shyness in each other's presence, or in repugnance to the companionship of the opposite sex. A little later there is a subtle attraction toward persons of the opposite sex, and a marked tendency to dress and act differently in their presence. This tendency soon becomes very strong. In the meantime, distinct sexual feelings have been experienced in connection with dreams or otherwise.

In the ideal normal development the sexual feeling and impulse are unconsciously the basis of the attraction toward the opposite sex, and of the desire to attract the notice of its members and please them. The age of love and romance has come, and well for the youth is it if in loving he is conscious only of the physical beauty and moral and intellectual worth of his love, while the unconscious sex passion remains an unrecognized but all-powerful force, impelling him to devote himself body and soul to the object of his regard.

After marriage and the birth of a child, the other form of the instinct, that of protecting and caring for the young, appears in its full intensity, especially in the mother. There are, however, earlier manifestations or premonitions of this instinct in caring for pets and younger children by both sexes, and in doll play, chiefly by girls. It would seem, therefore, that the impulse to care for young appears in at least a rudimentary form

before the impulse to produce young, though the latter instinct must be much older in the history of the race. It may be, however, that these care-taking impulses are the result of social influence and imitation, or as Hall suggests, of fetichism rather than of the development of the parental instinct.

The genuine care-taking or parental instinct of adults is by no means confined to those who are parents. Maiden aunts and bachelor uncles often seem to have more of it than the parents themselves. The best primary teachers have it in a marked degree, and a strong parental instinct may be regarded as essential to all who try to influence children and young people.

RELATION OF THE PARENTAL INSTINCT TO OTHER IMPULSES AND FEELINGS

Since the parental instinct is and has been in all ages absolutely necessary to the continuation of the species, and is in its very nature both individual and social, it has become associated with all forms of action.

On the one hand, it has developed the fighting tendency, since fighting for a mate is the most common form of combat. The tendency to competition is thus increased, courage is developed, and ambition aroused. On the other hand, it has developed the opposite tendency of seeking the favor of a mate. Most male animals engage in some kind of courtship in which they exhibit their powers and charms to the best advantage, and strive to please her.

The tendency to certain forms of play and to adornment is also increased by the sexual impulses. Darwin and others hold that there is a close relation between

the development of the æsthetic sense and sexual selection. It is significant that love is the most frequent inspiration to artistic productions in poetry, painting, and music. Lancaster finds that the appreciation of beauty is greatly increased at puberty. There is good reason, therefore, for holding that the æsthetic feelings and impulses are closely related to this instinct.

It is evident, without discussion, that the social instinct and feelings are only an extension of the parental instinct from the family to larger groups.

Moral impulses and feelings are evidently related to the parental instincts, since one of the first and most important forms of ownership is the ownership of a mate, and resulting from such ownership are certain rights and duties. In this instinct we find the first impulse to please, help, and guard others instead of to act wholly for self. The virtues of diligence in seeking food, and courage in fighting rivals and defending offspring, are developed in the males, and those of patience and tenderness in the females.

The relation of the parental instinct to the religious was long ago suggested by the fact that revivals and religious excitement were frequently accompanied by many engagements and marriages. Modern research has confirmed this view and shown that in all ages and among all peoples, religion and the sexual impulse are related in some way. The exact causal relations are not yet clear, but both instincts involve something of the same feeling of love, reverence, and self-devotion to the object of one's love. Hence religious awakening frequently results in love for some one of the opposite sex, and love often leads to religious interest. For similar

reasons sexual and religious excesses and abnormalities are frequently associated.

It is evident that the parental instinct is not only necessary to the life of the species, but also to the health and life of the individual physically and spiritually. No other instinct, therefore, exercises such a profound and far-reaching influence upon character.

RIGHT DEVELOPMENT OF THE PARENTAL INSTINCT

Since the parental instinct is one of the most powerful of instincts, and in man is related to all phases of his nature, it is especially important that it develop along right lines. In order that this take place there must be avoidance (1) of an excessive or perverted development, and (2) of unfortunate associations in consciousness.

(1) Sex feelings and perverted functioning of the instinct sometimes occur in young children and even in infants, but most commonly at puberty. Looking at the matter from the *physiological* side, we note that not infrequently some physical defect is the cause of sex excitement and perversion in childhood. Circumcision is often helpful in preventing such premature development in boys. Uncleanliness and irritation produced by clothing are to be avoided as frequent exciters of the organs. The ganglion especially concerned in the sex instinct is located in the lumbar region of the spinal cord, and heat is a most potent stimulus; hence the sleeping of a child with back to a feather bed or to a companion, especially in a warm room or under thick covers, should not be permitted. Stimulating food should be avoided, and as puberty is approached it is especially

important that the child have plenty of outdoor exercise and something to occupy mind and body.

From the *social* side it is desirable that boys and girls should play together freely without sex distinctions being made prominent. Social customs usually demand different conduct on the part of girls, but it were well to make the differences as slight as possible, before ten at least. Joking young boys or girls about their beaux is as objectionable as pulling at buds on the rose-bush long before they are ready to open. Boys and girls should be permitted to remain good comrades and chums as long as possible without any thought of love.

There is no reason whatever for separating boys and girls in primary schools. In secondary schools and colleges there are many arguments on both sides. There is no doubt, however, that sexual development is more normal and healthy when the sexes are together a great deal than when they are separated. This, and the fact that the best education for life is most like the life to be lived, are strong arguments for coeducation in this country, where men and women meet so much on equal planes after they leave school.

(2) The question of greatest practical importance regarding the parental instinct is, "What conscious associations with the impulse shall be formed?" The associations may be low and vile, or high and pure. In the one case, selfish sensualism is likely to result, and in the other, altruistic devotion and social service.

This matter is closely connected with the question of how boys and girls shall acquire a knowledge of sex functions.

It may be asserted that in the case of this as in other

instincts it is best to let the instinct gradually and naturally come into consciousness as it begins to function. This would be a good way to do were it not for a few very practical reasons against it.

In the first place, social customs and moral principles do not permit the functioning of the instinct except in a very limited and prescribed way, and that not until long after the instinct has become very strong; hence the necessity of controlling the instinct must be learned artificially rather than by the natural social punishment following indulgence.

Second, ignorance of sex functions cannot be preserved in boys or girls who associate with others. They inevitably acquire some knowledge, and that usually of the filthiest sort.


In the third place, the sex instinct, not having opportunity for its natural functioning, is likely to produce unnatural modes of gratification, whose evil effects are unknown to the youth. Recent studies indicate that this is the case among nine-tenths of the best boys. Such unnatural gratification is injurious physically when carried to excess as it often is, and always more or less damaging morally even if not carried to excess. This is especially true where the imagination plays a large part in the indulgence. The fountains of pure love, manhood, and decency are often forever befouled. The youth is thereby unfitted for the highest type of love, the most perfect union with one of the other sex, and the purest fatherhood. His social, æsthetic, moral, and religious capacities are also almost inevitably undeveloped or perverted.

The importance of giving the sexual impulse right

associations is very much emphasized by recent studies of sexual abnormalities. It seems that, on the one hand, almost anything, as an old shoe or the sight of blood, may become a stimulus to the sexual orgasm; while on the other hand, the unexpended sexual energy may be utilized in almost any line of physical, emotional, or intellectual life. Science, religion, and philanthropy, as well as art, literature, and industry, may be promoted, therefore, by the use of the unexpended energy of the all-powerful sexual impulse, diverted by appropriate associations into these channels.

It is surprising how long civilized people have continued to believe in the idea that children may be kept innocent sexually by keeping them ignorant of sex functions. It has always been a double failure, for the attempt to keep children ignorant has almost universally failed, hence on that score the choice is necessarily between half knowledge reeking with secret filth and evil suggestions, and full satisfying knowledge drawn from the pure fountain of parental wisdom accompanied with and suggestive of high feelings and holy impulses.

It is generally acknowledged that the sexual impulse is inevitably one of the most powerful inner life tendencies, especially during the adolescent period. This instinct may be the basis of all manly and womanly virtues, stimulating to love, tenderness, devotion, courage, and high aspiration in social, æsthetic, moral, and religious life, or the foul source of hate, brutality, self-indulgence, weakness, and low desires, in a purely selfish and beastly life; yet as a rule, young people are allowed to remain ignorant of all this.



No parent who loved his children would permit them to go out from his care into new surroundings, sure to make or mar them morally, without seeking to prepare them for avoiding dangers and securing benefits in the new conditions of life. The adolescent is entering such a life; hence there is no excuse for allowing him to enter it without some foreknowledge of the facts, possibilities, and dangers to be faced.

The imperfect knowledge gained from companions is both unsatisfactory and misleading. Lancaster found in the possession of one advertising firm, seven hundred and five thousand letters from boys who had thus consulted quacks regarding their perverted habits and real or supposed diseases. Some had paid hundreds of dollars for treatment, when the symptoms described were perfectly normal (such as sexual dreams). Many of the boys were suffering untold agonies because they supposed they were ruined physically, socially, and morally. They dared not speak to parent, family physician, or adult friend, but poured out their whole souls to these distant and unworthy strangers.

As to when the knowledge should be given, the answer is plain, *i.e.* when the child first questions regarding it and whenever further questions call for fuller explanations. An unanswered question is insistent; curiosity once aroused, grows by attempts of others to suppress or divert it, and the matter is almost surely dwelt upon secretly, and frequently knowledge is surreptitiously sought. If one waits till the advent of puberty, the mind of the youth is probably already befouled, and in any case, very much directing of attention to the matter at this time may stimulate undesirable

subjective states. To speak frankly for the first time to a child of this age, is also so embarrassing that not one parent in a thousand dare attempt it, though he knows it to be his duty. On the other hand, the perfect and unconscious innocence of the child of four who asks where he came from or about parts of his body, makes plain, unabashed speaking comparatively easy to adults who ordinarily cannot free the subject from its, to them, evil suggestions. Further and fuller information should be given as the child grows older. The tendency on the part of the child to go to the parent for information on this subject as frankly and freely as on other subjects, instead of seeking it secretly or of evil companions, should be carefully preserved.

Perfect truthfulness and frankness is the one essential, though much is gained by giving this truth sacred associations. Books written for the purpose of giving sex information may be useful, but should not wholly take the place of frank talks between parent and child. Teachers may sometimes be very helpful to young people whose parents have neglected their duty in this regard.

II. DEVELOPMENT OF THE SOCIAL INSTINCT

Men are preëminently social beings. Among all races of men are to be found, not only families, but larger aggregations, living in close proximity and association with each other. This is necessarily so, since solitary individuals have little chance of survival in the struggle for existence with nature and with groups of men. Desire for companionship is the natural inheritance of an ancestry that must have sought it in order

to survive. Hermits are therefore rare exceptions, while to most persons solitude is the greatest of punishments.

This instinct is manifested (1) in the tendency to seek the companionship of others, or *gregariousness*; (2) in the impulse to feel as others do, or *sympathy*; (3) in efforts to please others, or *love of approbation*; (4) in action with others for a common end, and for the good of others, or *altruism*.

(1) The *gregarious* instinct needs to be prominent in the young, as their life depends upon their associations with adults. Most children manifest a desire for the presence of adults before they can walk. A little later, though ordinarily shy of strangers, they seek the protection of any human being, if frightened by an animal. As early as the second year they manifest great pleasure in the company of children near their own age. Evidently they feel the greater likeness to themselves, and this "consciousness of kind" produces a relationship different from that with adults. Young children not only enjoy the company of other children as they cannot that of older people who are so different, but they also often understand each other much better than adults understand them.


Association with persons who are older, and with those who are younger, gives pleasure and valuable social development; but these are produced in greatest measure by association with those of one's own age, where there is both give and take, coupled with a better understanding and efforts for common ends. Children, even as early as the second year, receive an education from being with children of their own age that can be

obtained in no other way. The child who is never allowed to be with other children is deprived of a valuable birthright, and can never be quite the same socially as he would have been had he associated fully with other children. A child may be better in some ways and learn more by being kept with adults, but never can his whole nature be so fully developed.

Chums exercise a powerful influence over each other where the relation is continued for a long time, and this more or less complete sharing of life with another is a valuable experience. If, however, the relation is long continued, and is so close that there is no association with other persons, the effect is narrowing, because both are cut off from a wider social life. Again, if one of the chums is a leader and the other a follower, the results are unfortunate, for every child should have experience in both capacities.

(2) *Sympathy* is closely related to, and probably, to some extent, the product of, reflex imitation. The child reflects the emotional expression of others, and as a result feels somewhat as they do. Children, therefore, readily cry in terror, or laugh with glee, when those around them do so.

Real sympathy, of course, appears only when the child not only feels somewhat as others do, but consciously represents them as having feelings like his own. This is likely to occur in the third year. When the idea is once developed it is likely to be extended not only to persons, but to animals, flowers, and even sticks and stones. The child does not clearly distinguish himself from other things, hence his mental states are readily projected into them. He thinks of other things



as feeling as he does, hence all nature seems to rejoice or weep with him. When something in which he is interested is injured, he also feels the injury much as if it were himself. The child is thus, in a way, the most sympathetic of beings, because he is identified with everything that he knows. He begs that relief may be given as if he himself were the sufferer, as indeed he is to a considerable extent.

On the other hand, when interested in himself and his own actions, it is often hard to get him to think of any one else. As he gets a little older, and distinguishes more clearly between his own experiences and those of others, the individualistic instinct takes the lead, and rarely indeed does he feel an impulse to take suffering in place of another.

Again, the basis of a child's sympathy is his own experience, hence he is often indifferent to the deepest joys and sorrows of adults, though very sympathetic toward those who are annoyed by what is to him a cause of keen suffering.

In order to have sympathy aroused, one must not only have had experience of the kind concerned, but his imagination must be excited so that he puts himself in the place of the sufferer. Boys are often cruel, not because they wish to cause suffering, but merely because they enjoy seeing the victim make queer motions without once thinking how it feels. Sympathy, therefore, depends not only upon experience, but also upon the imagination.

(3) *Love of approbation* has its origin in the race, perhaps in the fact that approbation of mates must be sought, since the animals that do not make themselves

agreeable to the group they have joined are likely to be driven out to die. At any rate, the desire for approbation is very strong in young children, even when not developed by experience. The tendency to reflect the emotional signs and feelings of others, and thus to share the pleasure or disgust of the one observing him, is perhaps the basis of the child's desire to be looked upon with favor. The desire for approval never dies out, even in the breast of the most hardened criminal, who is often a hero to members of his own gang.

Even before a child can talk, he seems to be affected by words of approval or disapproval, if they are uttered in the appropriate tone of voice and with the fitting gestures and expression of face. When the fighting or competitive instinct is not aroused, the child is very sensitive to expressions of approval or disapproval from any one against whom he feels no antagonism at the moment. At first he cares most for approval of parents, later of teachers, then of companions. At puberty his ambitions are stirred and he wishes for the approval not merely of individuals, but for that of the world; in other words, he wishes to make a name and become famous. In middle life most men care more for their reputation, or, in other words, for the opinion others have of them, than for their own personal needs and individualistic desires. So strong is this instinct that what we eat, wear, read, and do, are largely determined by it.

Children are not only greatly influenced by praise and blame; but they act, to a considerable extent, as parents, teachers, and others expect them to act. Children thus often become what their teachers believe them to be, and many a boy has been saved by the

faith reposed in him by teacher, parent, or friend. It is therefore very important that educators should see the good in children. No one who has not a large faith in humanity, and in the possibilities for good in every boy and girl, should ever enter the schoolroom as a teacher.

The approval of companions as compared with that of parents and teachers gains in influence with advancing years. The approval desired is not merely personal approval of individuals, but of the social group as a whole. In other words, the child comes to have more and more regard for the *public sentiment* of the social group to which he belongs. After a few years in school the public sentiment of a group of boys, as expressed in taunts, such as, "girl's work," or "tied to mother's apron string," is a more powerful stimulus than the words or even the blows of the parent or teacher.

In the early years parents and primary teachers who have the love of their children may get them to do almost anything by appealing to the desire for *personal approval*; but as children get older they care more and more for the public sentiment of their social group. The successful grade teacher must therefore learn to understand, mould, and use public sentiment in governing her school; while the high school teacher must do the same, but may also rely upon the general principles of conduct accepted by the world.

(4) *Altruism*, the highest form of the social instinct, is shown in the tendency to act for the good of the social group of which one is a part, instead of merely seeking their companionship, feeling as they do, or seeking their approval. This tendency appears more or less prominently in the early teens.

At this time, when the youth first becomes capable of contributing to the life of the race, and of actually doing something for the group to which he belongs, his ambitions are aroused, and he dreams and plans for great deeds and great honors. The desire for approval is strong, but there is also a genuine impulse to self-sacrifice. Youths in all ages have been ready to risk life, limb, and reputation, not chiefly because they are ignorant and rash, but because they have an instinctive tendency to disregard self and act for others.

Youths are then also for the first time genuinely selfish, since if a selfish act is done now it may be in opposition to an altruistic impulse, while before this it had involved only a choice between immediate and remote pleasure to self. True selfishness emerges only when both the lower individualistic and the higher altruistic impulses are felt. The adolescent may therefore be the most selfish or the most self-sacrificing of beings, and is often each by turns.

The development of the impulse to social service is greatly favored by experience of all kinds in working with others for common ends. In such activities the individual's life is enlarged, and in contests of group with group, he subordinates his personal interests to the success of his party, thus securing the broader pleasures of the social life.

We find, then, the development of the social instinct marked by increased regard for the interests of others and for law. Laws come to mean not merely the rules of action which bring to the child the most favorable results, but standards of conduct to be conformed to, whether agreeable to self or not, because they are

for the good of the social group. This tendency is shown at the beginning of the teens, in class spirit in the school, in group games on the playground, in children's societies, and in the formation of gangs on the streets. Rivalry of group with group may be even more fierce than ever was individual rivalry at the height of the individualistic stage of development. The greater the rivalry, however, between groups, the greater the class spirit within the groups.

The social group, whose interests are regarded and promoted sometimes by self-sacrifice, is at first very small. Only slowly does the social impulse broaden into general philanthropy and feeling of human brotherhood. Class spirit is a phase of social development that needs to appear in a radical form and in connection with rivalry as a preparation for the higher phases of social development. It should therefore be encouraged, but care should be taken that there shall be frequent change and enlargement of the social groups engaged, otherwise there is arrest of development, narrow prejudice, and partisanship, rather than broad sympathy and philanthropic effort.

Exercises for Students

1. Give illustrations showing the strength of the gregarious instinct in adults, children, and animals. Report instances of showing effect of shyness as illustrations of the social instinct in children.
2. Give examples showing desire for companionship with those of one's own age, and the advantages of such companionship.
3. Describe one or more instances of chumming you have known, and the effects upon each of the chums.
4. What are the characteristics of a leader? Should every child have some experience as a leader? How may he get it?
5. What kind of chums do children desire? Report observations or readings.

6. Does being an only child, or the eldest or youngest of the family, have any special influence on development? What?
7. Describe instances of sympathy on the part of children.
8. Show that experience and imagination are necessary to sympathy.
9. Show how large a part love of approbation plays in social life and morals.
10. Show how the teacher may utilize the love of approbation of children.
11. In what grades has personal approval most influence? And in what grades is public sentiment more potent?
12. Discuss the kinds and degrees of self-government that may best be used at different ages.
13. Illustrate the prominence of altruistic ideals in the teens from experiment or observation.
14. Discuss the social value, to yourself and others, of membership in societies of various kinds to which you or they have belonged.

Suggestions for Reading

- On the significance of the parental and social instincts, read Drummond, *Ascent of Man*, chaps. viii and ix; Ribot, *Psychology of the Emotions*, pp. 248-259, 275-289; Small, *Ped. Sem.*, Vol. VII, pp. 13-68.
- On the general problem of sex, see Geddes and Thomson, *Evolution of Sex*; Ellis, *Man and Woman*; Clark, *Sex in Education*.
- On the sexual and social characteristics at puberty, see Lancaster, *Ped. Sem.*, Vol. V, pp. 61-128, and any other articles on "Adolescence." See also Bell on "Love between the Sexes," *Am. Jr. Psych.*, Vol. XIII, pp. 235-254; Brockman, *Ped. Sem.*, Vol. IX, pp. 255-276.
- On information regarding sex functions, see Hart, *Jr. Ch. and Ad.*, April, 1902, pp. 107-116; Barnes, *Studies in Ed.*, Vol. I, pp. 301-308, and the best of the books described in the latter article.
- On boys' clubs and other social activities of childhood, see Sheldon, *Am. Jr. Psych.*, Vol. IX, pp. 425-448; Forbush, *Ped. Sem.*, Vol. VII, pp. 307-346; *The Boy Problem*, chaps. ii and iii; Buck, *Boys' Self-Governing Clubs*; Riis, *Children of the Poor*, chap.

- xiii; Gladden, "The Junior Republic at Freeville, *Outlook*, Oct. 31, 1896; Shaw, "Vacation Camps and Boy Republics," *Rev. of Rev.*, May, 1896; Johnson, "Rudimentary Society Among Boys," *Johns Hopkins Univ. Studies*, republished in *Teachers College Record*, 1901.
- On chums, see Bonser, *Ped. Sem.*, Vol. IX, pp. 221-236; and on leadership, Barnes, *Studies in Ed.*, Vol. I, pp. 295-298, and on only child, see Bohannon, *Ped. Sem.*, Vol. V, pp. 475-496.
- On social ideals and attitude toward law, see Barnes, *Studies in Ed.*, Vol. I, pp. 213-216, 254-258, 259-263, Vol. II, pp. 5-30, 37-40, 124-140, 141-150, 203-217, 218-230; Sully, *Studies in Childhood*, chap. viii.
- On the development of the social consciousness and social training, read Monroe, *N. E. A.*, 1898, pp. 921-928, or *N. W. Mo.*, Vol. IX, pp. 31-36; Boone, *Ed.*, Vol. XXII, pp. 395-401, Vol. XXIII, pp. 83-89, 270-276, 617-621; Wiggan, *Children's Rights*, pp. 109-138, 171-186.
- On pity and sympathy and other social feelings, see Hall and Saunders, *Am. Jr. Psych.*, Vol. XI, pp. 534-591, and Ribot, *Psychology of Emotions*, 230-234, Baldwin, Vol. II, pp. 220-246, Tracy, pp. 55-59. See also Hugh on "Animism of Children," *N. W. Mo.*, Vol. IX, pp. 450-453, Vol. X, pp. 71-74; Hall and Smith, *Ped. Sem.*, Vol. X, pp. 159-199; Jones, *Psych. Rev. Supple.*, Vol. V, No. 5.

CHAPTER VIII

DEVELOPMENT OF ADAPTIVE INSTINCTS—IMITATION

CHARACTERISTICS OF IMITATION IN CHILDREN

IN general, we think of acts as imitative when they reproduce acts that have been observed by the performer. The psychological basis of imitation, is the general tendency of the idea of an action to result in the action. In imitation the idea of the act comes more or less directly from the perception of the act as performed by another. It is imitative just in proportion as the idea and the impulse are derived from the perception of the act.

If a *hungry* child begins eating when he sees some one else eating, the act is not properly imitative, for the child knows what eating is, how to eat, and has a tendency to eat, while the sight of some one else eating does nothing but suggest the idea, which would probably be aroused just as effectually by the sight of food or even by the utterance of the word "dinner" or the sound of the dinner bell. If, however, a child tries to eat *like* some one else, the mode of eating is imitative because the idea of *how* to act is gotten from the observation of the act. If a child eats when *not hungry*, or eats something he does not like because he sees another eating, the act is imitative, because the impulse to perform it results from observing its performance. When

a child makes a new sound that he has heard, or tries to pack a trunk after seeing for the first time some one else do it, the act is imitative in a greater degree than in the preceding; for the idea of the act, how to do it, and the impulse to perform it are all the result of observing its performance.

Many of the child's acts are imitative in this sense, but it is doubtful whether this is true of many animals. Chickens, cats, rats, and dogs may run toward food or away from danger, or begin searching for food at sight of companions doing the same, or make noises in response to noises made by their kind, and such acts are often called imitative; but the animals know how to do these things and have a tendency to do them, and perceiving them done by another merely suggests the idea without modifying its form or giving it much impulsive force. Thorndike and Small found that animals which observed their mates do *new* things, such as opening a cage, did not learn more quickly to do them than those that had no such chance for observation. Trainers of dogs and horses for show purposes also depend but very little upon imitation. It seems, therefore, that the imitative tendency is not strong enough in most animals to cause them to perform *new* acts they have observed, but only to suggest the doing of things to which they already have a tendency, and perhaps to modify the mode of doing (as in the case of birds learning to sing).

Children, however, have a strong tendency to observe and perform new acts; hence imitation is an important means of widening their experience and fitting them for various activities and conditions. In most animals imitation does little more than specialize and develop ten-

dencies already possessed in some degree, in ways that will favor survival; while in children it leads to an almost infinite variety of action and adaptation to varying conditions.

CLASSIFICATION OF IMITATIVE ACTS OF CHILDREN

(1) *Reflex imitation* is shown when a child is caused to do something he has a physiological tendency to do by perceiving the act performed by another. Yawning, crying, laughing, and other emotional expressions, which may be reproduced by children in the first half year, are of this class. The stimulus to reflex imitation is largely *sensory*.

(2) *Spontaneous imitation* is shown when acts not provided for by other instincts are reproduced without any purpose other than the all-sufficient and unconscious one of an impulse to reproduce and to experience subjectively what has been observed objectively. The stimulus is usually a *perception* of some kind. Everything, from the crowing of chickens to the whistle of a locomotive, from the wriggling of a snake to the preaching of a sermon, is imitated. Nothing in his environment, physical or social, escapes the child; he absorbs and makes it all a part of himself by reproducing, and thus getting a subjective knowledge of it. For three or four years this form of the instinct is dominant.

(3) *Dramatic* or constructive imitation is closely allied to the spontaneous, and differs from it chiefly in that the child now finds his own mode of reproducing or representing ideas. *Images* of previous perceptions are the usual stimuli. As in spontaneous imitation,

there is no purpose outside of the act itself. Things heard or read, as well as those observed, are imitated; but the reproductions are not literal. Persons, animals, stones, and blocks are transformed in various ways by the imagination, and made to aid in the representations. Symbols and images thus take the place of real personalities and acts.

(4) *Voluntary imitation* or imitation for a purpose appears when a child reproduces an act, not for its own sake, but to gain some end, as when a child imitates a word he has heard in order to get what he wants, or tries to walk like some one else to make people laugh, or tries to handle a spoon or pencil as some one else does, in order that he may eat or write successfully. This form of imitation is concerned merely with *how* to imitate or represent. The impulse depends upon the end to be gained, and not upon the mere perception of the act. Voluntary imitation is always more or less analytic and synthetic, attention being directed to the parts of the process, and to the order of combination or synthesis. *Memory* images are the guides in voluntary imitation. When a child imitates spontaneously the act of writing, he simply takes the pencil and scratches around with it; but when he voluntarily imitates the drawing of another, he watches his successive movements and tries to reproduce them.

Voluntary imitation is a different act from spontaneous imitation, as was most strikingly illustrated in the case of a child who, before the close of the first year, reproduced with phonographic exactness every word she heard; but later, when she tried to use words voluntarily as a means of expressing thought, she went

through the usual stages of mispronunciation. Not often is this so marked; but every observer of children knows that children who spontaneously imitate the tones of those they hear speak and read, often find it difficult or impossible to do so voluntarily in response to a request. Every one can laugh or cry spontaneously, but few can do so voluntarily.

(5) *Idealistic imitation* is that form of imitation in which there is an attempt to act according to a copy or standard conceived as correct and desirable. It is guided by *concepts*. It is an attempt, not to reproduce or represent any one act or object, but to produce an ideal derived from these numerous particulars. Such ideals, whether social, æsthetic, moral, or religious, are naturally formed and imitated not from a study of their expression in the form of general truths, but as shown in concrete acts and objects.

DEVELOPMENT OF IMITATION

The different varieties of imitation combine and overlap so that detailed and exact statements cannot be made; but the general order of prominence is evidently that in which they have been named.

(1) *Reflex imitation* is the only form of imitation until the second half of the first year. Later it is obscured, but remains all through life as an important form of suggestion. It is for this reason that good humor and bad humor, politeness and rudeness, carefulness and carelessness, are "catching." All persons, but especially children, are like mirrors reflecting back what they observe, responding to smiles with smiles, and to irritable words with similar words and actions.

The personality and mood of each person is manifested in some degree in his face, voice, and actions, and the child reproduces reflexly to a greater or less extent every such manifestation, and is himself modified by it. If several children are together, each acts reflexly on the others. The teacher who comes into the room in the morning in an irritable mood, soon infects some of her children, and these others. She is therefore confronted ere long by an irritable and irritating school; while the teacher who has entered the room with cheerful good humor and kindly feeling, is soon surrounded by a joyous group of children eager to follow her leading and respond pleasantly to her slightest suggestion.

(2) *Spontaneous imitation* usually becomes very prominent the latter part of the first year. Although concerned with new acquisitions, reflex imitation is often combined with it, as when the tone in which a new word is uttered is reproduced as well as its pronunciation. In fact, the early imitations of words are often merely imitations of tones and inflections of voice rather than of specific sounds. This is probably due to the early development of reflex emotional expression.

Sometimes the early spontaneous imitations are of single sounds and gestures, and sometimes of more complex acts. My little girl imitated acts at first, as poking the fire, packing a box, driving a nail, but never gestures, such as raising the hand, nodding the head. Neither did she imitate words as such, but only the act of speaking on occasion. Children frequently reproduce sounds like a phonograph, and gestures, like a shadow, sometimes without ceasing their play to do so.

In no case, however, is spontaneous imitation analytic and synthetic. It is always of wholes, large or small.

The value of spontaneous imitation lies in the great amount of material accumulated in the form of knowledge and power of movement, which may be used or analyzed and combined, then used in future actions for a purpose. The knowledge thus acquired is of immense extent and of the most fundamental character, for it is subjective as well as objective. The child learns to know movements and sounds not only as they are seen and heard, but also as they are felt when performed or uttered, and he can not only recognize them, but also control them. Thus by spontaneous imitation he makes the world his own and obtains control of it.

Although so various, spontaneous imitations are not the result of chance. Nothing is imitated that does not attract the attention. Attention is determined by the prominent instincts or experiences as they appear in the life of the developing child ; hence, the spontaneous imitations of each age are indications of the stage of development that has been reached. The investigations of Frear indicate that young children spontaneously imitate animals and children, while in the majority of cases older children voluntarily imitate older persons.

At about three years of age *contrary suggestion* often appears, and at more or less frequent intervals, controls the child's action. The child seems to be surfeited with taking into himself and reproducing from his surroundings. He therefore asserts his own individuality, which has heretofore been merged in whatever he imitated, and refuses to follow the copy set before him. He not only refuses to do what others do, and what it is

suggested that he shall do, but as far as possible does just the opposite of what the imitative impulse would impel him to do. Usually these attacks are intermittent; but if unsuccessful attempts are made to forcibly suppress them, they may become chronic, especially if the child is not in perfect health. If no notice is taken of such attacks of contrary suggestion or self-assertion, or if they are vigorously suppressed instead of combated just enough to develop them, they are likely to soon yield to the more fundamental impulse of positive suggestion or imitation.

Spontaneous imitation develops not only by becoming more complete, and being concerned with more complex acts, but by appearing in response to mental images as well as to direct perceptions. Words, gestures, and processes observed yesterday are reproduced to-day as spontaneously and accurately as if just perceived.

(3) When the above stage of spontaneous imitation is reached, *dramatic imitation* usually begins. Dramatic imitations are not clearly differentiated in the mind of the child, or easily distinguished by the adult observer from spontaneous imitations. In purely spontaneous imitation the child reproduces literally, as well as he can, what he has observed, while in dramatic imitation he does not. Sometimes, however, he forgets that he is only making believe, and screams with terror at the attacks of a make-believe bear or weeps over the mishaps of the make-believe baby or kitty, or actually chews the make-believe bread, or is really worried by the idea that he is going to be left by the imaginary car, or cries with the pain of an imaginary burn or stomach ache. Usually, however, there seems to be a sort of under-

consciousness of the make-believe character of it all, which, as long as it remains, heightens the pleasure of trying to make it seem real.

Dramatic imitation greatly increases the possibilities of varied development, for much of what the child observes or hears involves actions or objects unattainable to him. There is nothing, however, from the noises and movements of a locomotive to the silent art of Jack Frost, or from making a pie to constructing a church, from burglary to a fashionable tea-party, that the child cannot imitate by the use of make-believe objects and symbolic movements. The essentials of every process and action in the heavens above and the earth beneath, of which the child sees or hears, are made familiar to him in his dramatic imitations. He learns something of every custom of society, and every trade and profession, by the short-cut application of that most important of all pedagogical laws, "learning to do by doing," which is also the only sure way of learning to understand.

What a change would result if this dramatic power and tendency to imitation could be more frequently, sensibly, and effectually utilized in the kindergarten and school. In its very nature, dramatic imitation is spontaneous and original; hence any attempt at systematic control of it must, in the nature of the case, almost inevitably prove artificial and ineffective. The wise teacher merely stirs the imagination, supplies the material for dramatic representation, and gives occasional suggestions as they are needed. For example, some sixth-grade children, who were taught geography in such a way that with very little help and suggestion

they eagerly presented in character the different races, in costumes which they had made, gained more of real development than in a term of formal memorizing.

Froebel did well to recognize the dramatic tendency in children ; but his followers have often done ill to use the particular processes and occupations given by him, at stated times, instead of those most common and interesting in the child's environment, and at the most favorable times.

The dramatic tendency usually begins in the third year and continues all through life, but is at its climax from about four to seven. During this time the child not only transforms objects, but persons, including himself, into whatever his fancy dictates or his dramatic play demands. He assumes the part of some other person, or of an animal, and perhaps for days at a time acts out the character to some extent, and insists upon being called by the name of the person or animal represented. So great is the tendency to represent by substitution, that even words are made to serve new purposes, as "yes" to mean "no." Sometimes the child at once forgets the arrangement he has made; then again he adheres to it for days or weeks, and insists that others do so.

This is the age also for the creation of *imaginary companions*, and a careful study of the matter will probably show that not only do a few lonely and highly imaginative children have these companions, but nearly all children have them in some form, for a greater or less period of time. It is only one step from representing persons by blocks to representing them in the mind without any tangible object. These imaginary companions frequently

appear in the third year when the child is getting acquainted with his own variable personality, which is sometimes "nice" and sometimes "naughty," or in connection with early experiences with a playmate who is not present all of the time, or after hearing of a little boy or girl of a certain character. Sometimes the imaginary companion is an ideal self, sometimes a naughty scapegrace, and at other times not self at all, but a distinct personality. The same child may have many such companions at once, or one at a time in succession. Where the phenomenon continues, as it sometimes does, into adult life, it often takes the form of a continued story, in which the imaginary characters figure, and perhaps grow older as their creator does.

Curiously enough, during this make-believe age, the child is the most literal of beings as well as the most imaginative. Left to himself, he often has a wonderful perception of the essential truths symbolized; but when something is presented to him in symbolic form, and he has no experience corresponding to that symbolized, his ideas are surprisingly literal and materialistic. For this reason religious instruction often produces in the child's mind a gross caricature of holy things. For example, a boy did not want to be Jesus' "little lamb," because he would then have to eat grass. Myths and fairy stories also often fail to teach the truth intended, because the truths symbolized have not been experienced by the child.

(4) *Voluntary imitation* appears in the second or third year, but does not become prominent for several years. When a child, instead of freely repeating over and over the same sound in the same way, tries again and again

to speak a word as another does, each time changing his pronunciation a little and getting nearer the correct form, we have an example of voluntary imitation, because it is performed, not for the pleasure of the act, but to secure the approval that follows its successful performance, or the pleasure of being understood. Since, as we have defined it, voluntary imitation is for a purpose, it is concerned chiefly with the *mode* of performance.

Whenever a child is trying to find out how to do an act, he is very ready to voluntarily imitate any mode of performing it that he sees. It is also much easier for a child to imitate the performance of an act than it is to form an idea from a description of how it is to be done and then do it. Voluntary imitation is, therefore, one of the most important means of instruction, especially with young children. They can learn by watching how a thing is done, in a fourth the time required to learn it by being told how it should be done. This is true not only of manual but also of purely intellectual processes. A child learns to add or use good language by imitation better than by rule. Imitation might, therefore, very frequently be substituted for directions and rules. With younger children the imitations should be largely spontaneous, while with older ones it should be voluntary, and with still older children should be followed by analysis leading to specific directions or rules. Where the process is complex, some analysis is helpful in learning it; but the analysis should be simply into parts or simpler wholes that the child can grasp, rather than into separate elements such as the scientist is able to detect. Most of the practice should also be upon the whole process rather than upon the elements.

In using voluntary imitation educationally it is not best to merely give models for imitation. On the contrary, voluntary imitation should be simply a means of accomplishing successfully something that the child already has a desire to perform. The great defect in teaching has been too much analysis of processes into elements, and too wide a separation of processes from the ends they are fitted to secure, so that the natural motives for learning are destroyed.

Unquestionably it is the function of the school in preparing the child for the work of life to develop the power of voluntary effort, and this means at first chiefly the power of voluntary imitation; but it does not follow that spontaneous imitation should not be utilized, or that the child should be required to voluntarily imitate what he has, as yet, no motive for learning to do. The child acquires the power and tendency to persistent effort by the act of persisting in what he attempts; and if he can be held to a task by the desire to learn how, in order that he may do something that he wishes to do, the motive is a natural one and far more effective than those arising from artificial punishments or rewards.

(5) *Idealistic imitation*, which is a sort of generalization from all other kinds, begins perhaps in the third or fourth year when a child has formed some idea of objects and acts that are "pretty" or "nice." A little girl of four who admired a little girl in a story who always walked and talked quietly and nicely, imitated her and apparently thought of her as an ideal. In a similar way, a boy of three seemed to have a pretty good idea of "Papa's Jolly Boy," and sometimes when not feeling well made considerable effort to smile and look pleasant

under the inspiration of that ideal. Such idealistic imitation is, however, largely a matter of training till the teens are reached.

Spontaneous imitation leads the child to imitate everything that attracts his notice, whether profanity or prayer, caresses or cruelty, rudeness or politeness. There is little or no selection of the more admirable for imitation except as it is presented more often or made attractive by the approval, coöperation, or help of others. In the home, at school, and on the playground some selection of ideals, leading to their imitation, is brought about by the attitude and actions of parents, teachers, and companions; but for the most part children imitate certain ideals of conduct not so much because the ideal itself appeals to them, as because adherence to it secures the approbation of others, and ignoring it, their disapproval and perhaps punishment. These ideals are built up and strengthened by stories of persons performing admirable actions and receiving praise and reward, and of the opposite results from the performance of bad actions. The ideals admired and imitated by the child are not his own, but those of his people and his times.

This remains true, in large measure, till the child reaches his teens, when he begins to find that within himself which responds with admiration or disgust, to certain deeds, acts, and objects. It is no longer merely his own interests or the opinion of others that arouse the feelings, but something within himself that reaches out toward or draws back from certain objects and acts, regardless of consequence. This is emphatically the age of ideals and of hero-worship. Now, if ever, the individual is stirred by ideals of the strong and

true, the beautiful and the good. Spontaneous imitation, and past and present example and training, still have their influence upon the selection of ideals for imitation, but not, as formerly, entire control. In this stage of ferment and change from which is to emerge a more or less unified and permanent individuality, there is developed an inner principle of selection that results in the formation of ideals for imitation. It is not a mere selection, as formerly, of certain objects, persons, and acts for imitation, but a selection, from various sources, of *qualities* that appeal to the individual, and a combination of them into standards and rules of conduct.

Often the youth forms ideals without at once imitating them. He feels their worth, but has not the force of will to realize them in his acts. Usually, after a period of variable action, the ideals or the habits are modified so as to bring them more nearly into harmony, and the character of the developing man is pretty firmly established at a higher or lower level, according to the kind of ideals formed and imitated. Sometimes, however, the gulf between approved ideals and practice results in a permanent division of personality, in which one phase of it, then the other, dominates, as in "Dr. Jekyll and Mr. Hyde." This condition is much more likely to result when children have either been led to form high ideals without being induced to imitate them, or when they have been compelled to act according to certain standards which they have not been led to approve. If the child has learned to both admire and imitate his ideals, and if these ideals are merely deepened and broadened but not fundamentally changed during the transition period, then there is no break in the develop-

ment; but the new element that comes into the youth's life merely perfects and completes what was begun before the age of transition.

Exercises for Students

1. Describe instances of imitation and indicate in each case how far perception of what is imitated gives any or all of these: (1) the idea of the act; (2) of how to do it; (3) the impulse to perform it.
2. Give examples of imitation in animals and compare with imitations of children, showing the difference.
3. Show how imitations by children lead to many adaptations, or, in other words, to the gaining of much valuable knowledge and experience.
4. Give original illustrations of each class of imitations.
5. State the order and the ages at which the different kinds of imitation become prominent.
6. Show the importance of reflex imitation in school. Is there any reason for objecting to the presence of stammering or nervous children in school? Can a noisy, unsystematic teacher teach children to be quiet and orderly? Why?
7. Show how spontaneous imitation prepares for the doing of useful acts in the future.
8. Give illustrations of contrariness as opposed to imitativeness in children.
9. Give examples of dramatic imitation that you engaged in as a child or have observed in other children.
10. Give examples of the ways in which dramatic imitation may be utilized in school.
11. Describe imaginary companions that you have had or that you know of other children having.
12. Give illustrations of symbolism that children have or have not appreciated.
13. Show how voluntary imitation may best be used in gymnastics, drawing, writing, word building, etc., indicating parts that need special practice, and the motives to imitate, that may be appealed to. Should a teacher seek to secure good vocal expression in reading

by much use of voluntary imitation, or should she depend on spontaneous imitation and natural emotional expression? Why?

14. Describe your idealistic imitations at different ages.

15. Show why ideals are especially important during the adolescent period, and indicate a variety of means that may help in the formation of high ones.

Suggestions for Reading

- On imitation in animals, see Thorndike, *Animal Intelligence*, pp. 47-64; Monograph Suppl. to *Psych. Rev.*, No. 15; Mill, *Animal Intelligence*, pp. 163-164; Small, *Am. Jr. Psych.*, Vol. II, pp. 160-164; Kinnaman, *Am. Jr. Psych.*, Vol. XIII, pp. 196-200.
- On the nature and significance of imitation, see Baldwin, *Century*, Vol. XLIX, pp. 160-164; *Mental Development*, Vol. I, pp. 263-278; Royce, *Century*, Vol. XLVIII, pp. 137-145; *Psych. Rev.*, Vol. II, pp. 217-235; Ellwood, *Am. Jr. Sociology*, Vol. VI, pp. 721-741.
- On suggestion and early imitations, see Baldwin, Vol. I, pp. 104-134; Preyer, *Senses and Will*, chap. xii; Tracy, pp. 102-103; Compayre, Vol. II, pp. 1-17.
- For descriptions and discussions of what children imitate, see Haskell, *Ped. Sem.*, Vol. III, pp. 30-45, or *Child Observations*, Frear, *Ped. Sem.*, Vol. IV, pp. 382-386; Sudborough, *N. W. Mo.*, Vol. VII, pp. 99, 136, 162, 226, 300, 352; Waldo, *Ch. S. Mo.*, Vol. II, pp. 75-87.
- On choice and imitation of ideals, see Barnes, Vol. I, pp. 243-253, Vol. II, pp. 243-270; Chambers, *Ped. Sem.*, Vol. X, pp. 101-143, and references given by the latter.
- On imaginary companions, see Barnes, *Studies in Ed.*, Vol. I, pp. 98-101; Learoyd, *Am. Jr. Psych.*, Vol. VII, pp. 86-90.
- On imitation in relation to education, Deahl, *Imitation in Education*, *Columbia Univ. Contrib. to Philos.*, 1900, pp. 103; Van Liew, *N. W. Mo.*, Vol. VIII, pp. 320-327; Ledyard, *N. E. A.*, 1899, pp. 547-551; Harris, *N. E. A.*, 1894, pp. 637-641.



CHAPTER IX

DEVELOPMENT OF ADAPTIVE INSTINCTS—PLAY

THEORY OF PLAY

+ Salable

THE older theory set forth by Spencer considers play to be the activity by which surplus energy is used. If we conceive of surplus energy as meaning superabundance of energy, the theory is not true to the facts, for children must be very sick or tired before the play impulse disappears. If, however, the word "surplus" is taken to mean, in a general way, the energy which is most easily set free, then play may properly be looked upon as the activity by which such energy is most likely to be utilized.

The more recent discussions of play, especially those of Groos, have emphasized its instinctive character. It is shown that young animals of all kinds have the play impulse, and that the form of the play is related to the instincts of the animal. In general, the animal uses the same powers that his ancestors have used in gaining food, avoiding enemies, and securing the perpetuation of the species, and thus exercises the powers he will himself need to use when no longer protected by paternal care. Each instinct as it appears is thus developed and perfected by playful activity before it needs to be used seriously.

These two theories need to be combined. In play there must always be some energy that is surplus in the sense that it may be used in other ways than to obtain necessary ends. The activities that are most readily initiated are of parts that have most available energy, either because they are growing and developing or are less fatigued than other parts. The way in which the active parts are used, depends upon the openness of certain "paths" connecting them, which is determined largely by the instincts that are coming into prominence at the time. The plays of young animals are therefore greatly influenced by the order in which their powers and instincts develop, and, in turn, play directly promotes the development of powers that will be needed in adult life.

In the case of adults, play is influenced by fatigue, and is a means of developing powers not used in daily work; hence it aids all-round development and furnishes a means of recreation. Play and necessity are the chief means of learning. In children, who are largely shielded from necessity, play in its various forms is the more important factor in development.

WORK, PLAY, AND AMUSEMENT

Objectively, work and play cannot be distinguished, though the results of playful activity are usually of little importance or prominence, while work usually has results that are more or less valuable and permanent. *Subjectively*, an act is play in so far as the activity itself is enjoyed; while it is work in so far as the end gained is the chief thing desired. A playful act is freely chosen for its own sake, while work is

performed because it is a means to some end which one feels bound for one reason or another to secure.

Physiologically, work requires the use of the same parts of body or brain in the same way, for a considerable time; while play exercises many parts of the body in a variety of ways, and usually no one part for very long without change.' In work, the least available energy is often used, and the activity is always directed; while in play, parts having the most utilizable energy are freely active. For this reason work is much harder and more wearisome even when the amount of activity is less.

Many acts involve elements of both work and play. Some of the elements may be disagreeable, and involve the continued use of parts that have little disposable energy; but if the complex act as a whole is freely chosen and enjoyed, aside from the ends secured, the act is play.

To the child play is natural, but he needs to learn to work. In so doing, however, it is not necessary that he cease to play. On the contrary, play is one of the most effective means of learning to work. Obstacles are met in most plays, and the child must do many things that in themselves are disagreeable, in order that he may perform the desired action. The act, as a whole, is play, though parts of it are work. The more complex a child's play becomes, the more does he work in performing parts of it. Materials must be collected before a tea-party can be held; bait must be dug and a long tramp taken before fishing is possible; bases must be marked out before the ball game begins, and forts must be built before the snowball battle opens. The boys

who cleared a field of stones in dramatic play, by representing the stones as water, and the pile where they were dumped as fire, were playing, though doing with much more than their usual working vigor what would have been very hard and tiresome without the playful exercise of the dramatic instinct to lighten it and make it enjoyable.

Nearly every adult must of necessity work, yet his work may be to him a most enjoyable play if it is well chosen and carried on in the proper spirit. If it is so well suited to his powers, and he takes such a pride and pleasure in it that he would continue to perform it if relieved of the necessity of thus making a living, then he is really playing while he works. This is perhaps more often the case with artists, authors, and inventors, but it may be equally true of a farmer, business man, mechanic, motorman, or of a teacher.

Games are intermediate between free play and work because they involve more or less direction of activity according to rule, and more or less repetition of the same acts; yet they are always chosen and played for their own sake, and not for results to be gained. Professional players, who are after the rewards rather than the pleasures of the game, are not playing but working.

Amusement is a mild and passive form of play, a name of which it is scarcely worthy because it involves so little activity on the part of the one being amused. Some one else does the work (though perhaps in the form of play), while the seeker after pleasure enjoys it if he can. Here, as in other cases, there is little to be gained without earning it. One who has been working hard may get a great deal of enjoyment and rest from

amusements; but one who devotes his life to amusements, ceases to enjoy them. To amuse, a thing must be novel or appeal to phases of one's nature not affected by one's occupation. To hard-working people, with little surplus energy, amusements are a valuable means of rest and sometimes a source of general culture. To those whose available energy is used in their daily tasks, amusements are almost indispensable, and play scarcely necessary; while for all others active play is essential, and mere amusement of secondary importance. Children, in general, need play rather than amusement.

In these days of urban life and specialization, in which not one per cent of a man's powers is used in his occupation, play is of far more importance than formerly. The man who does not play in some way soon degenerates, because so few of his powers are used.

CHANGES WITH AGE AS REGARDS FREEDOM IN PLAY

The first plays of children are wholly free, *i.e.* follow no rules. Attempts to direct a child's activity by showing him how to pound or build are often resented in the first year or two. During the next three or four years, customs which serve the purpose of rules of the play may be established through imitation; but any attempt to dictate when, what, or how a child shall play is met with opposition. Suggestions other than imitative must also be given with care.

Upon entering school the child is ready for games with very simple rules, but quickly loses his interest in a game having many rules, because too much voluntary effort is required to play it. For example, drop the handkerchief is enjoyed very much when there is no

rule except to pick up the handkerchief and choose the dropper, then to leave it behind some one else ; but if the more complex form is tried, in which the one behind whom it is dropped must discover it for himself, or go inside the ring, or must run in a certain direction while the dropper, if caught, goes inside the ring, and those inside get out by being the first to seize the handkerchief when dropped behind some one in the circle, very young children find it puzzling and irksome, though older children, familiar with the game, enjoy it more than the simpler form.

During the first five years the child's activities belong almost wholly to the kind called play, while in the period from five to ten, games become more and more prominent, and after twelve, plays, as ordinarily understood, have almost wholly given place to games and sports.

Play must always be free in the sense of being engaged in because the individual wants to perform the acts for their own sake and their immediate results, such as satisfying the instinctive desire to win in a contest. If a person is forced to play, or paid for playing, the act is at once transformed into work. Tennis played *only* for the benefits of the exercise is not play but work.

Play becomes less free with age, in the sense that activity is directed in definite lines by the requirements of the rules of the game. This conformity to law does not decrease the freedom of the individuals engaging in the more complex group games, but rather increases freedom by restricting the action of each individual as to kind, time, and place, so that one may not interfere

with another. Children enjoy playing with an older person who leads according to rules, and they thus learn to appreciate the value of rules, so that they become indignant with the companion who interferes with the game, and consequently with the freedom of each player, by refusing to conform to rules or by trying to cheat.

The great lesson of law as a means of freedom is nowhere so well taught as in well-directed and orderly play. In no other place can a child so fully realize for himself the value of law as on the playground. A teacher who can successfully lead children to play happily in accordance with whatever rules are necessary, is not only forming a public sentiment in favor of orderly and fair play, but she is also preparing the children for good citizenship more effectually than she can possibly do in the schoolroom, where the children have not so keen a personal interest in what is being done.

CHANGES WITH AGE AS REGARDS POWERS USED IN PLAY

Children begin playing in the second quarter of the first year, and long before the close of that year have engaged in a great variety of plays. Almost every sensation and movement that comes under their control is repeated again and again as play. Objects are scratched, rubbed, pounded, rolled, and tossed about almost continually. If in doing so the eye and ear are variously stimulated, the pleasure is all the greater. Not only objects, but parts of the child's own body, are used as instruments of play. This is perhaps most marked in the case of the mouth and vocal organs, which during the first year or two are endless sources of amusement. The powers most exercised in this early play are evi-

dently those of the sense organs and the muscles. There is no attempt to use them accurately or in any definite way, but merely to use them freely over and over, yet as it happens with infinite variations. In shaking brightly colored balls or a rattle it is hard to tell which is the greater source of pleasure,—the varied and repeated muscular sensations, or the changing and recurrent visual and auditory sensations ; but either alone is sufficient to call forth the play instinct, for the sight of waving ribbons or dancing sunbeams is a visual play, as are sound jingles auditory play, and movements of limbs muscular play.

For two or three years the child's play is almost wholly physical and perceptive. Great progress is made, however, during this time, for the movements become much more complex, so that all parts of the body are used at once, and they are not merely used but exercised in doing specific things involving some accuracy, as in preserving the balance when jumping or throwing something, or in hitting objects or piling them up so they will stay.

On the mental side, also, there is great change, for it is not mere sensation that is exercised, but perception of relation and likeness, difference and space, as the child pounds objects and puts one inside of or on top of another and arranges (or scatters) them to his satisfaction.

In the third year the representative powers are developed sufficiently to be exercised in play. The child begins to find amusement in reproducing or representing acts and events that have been observed on previous occasions. He delights in reproducing phrases, rhymes,

and actions, and in representing events, as a visit to a neighbor or a ride. Soon nearly all of his play is transferred to the field of imagination, where his freedom is complete; and no object is so remote, rare, or costly that he cannot have it in the form of a representation, and no process so difficult that it is not readily performed (in his mind) by the manipulation of a few simple objects. Feasts and fêtes are provided on short notice, and without the hitches that so often trouble adult dispensers of hospitality.

Imagination, as the important factor in the child's plays, usually reaches its climax in the fifth and sixth years, but continues to be an important though decreasing element in his plays and games till puberty. Fairy stories are interesting largely because they give playful exercise to the imagination.

As the child grows older, mere exercise of physical powers becomes a less important element, though any new movement, as standing on the head, turning somersaults, skinning the cat, walking on the hands, etc., always appeals to the ever-developing instinct of play. After five or six years, familiar movements are not made in play merely to use the power, but to use it in some definite way, involving quickness, strength, endurance, or accuracy. From six or seven years to puberty, testing exercises of physical powers are important elements in the plays and games of children, especially of boys. The latter part of this period there is not only desire to do what companions can or what they cannot do, but to reach certain standards, to "make records."

On the mental side the changes from six to twelve are

of a corresponding nature. Perceptive and representative powers are not merely used, but tested. Thought power has been used to some extent before this time in connection with the imagination, in judging and reasoning as to the proper and logical mode of representing persons and events (*e.g.* the larger stick must be papa and he must sit at the head of the table or must drive the horse, or the yellow block must be the car and the black one the engine and the latter must be in front). Thought power as a distinct element in the pleasure of play is not, however, very prominent till about seven or eight, when guess games and riddles begin to have a great fascination. A little later, games especially exercising thought power, such as morris, checkers, cards, authors, come into favor, and later the most intellectual of all games, chess.

In general, we may say that every power, physical and mental, as it appears, is playfully exercised, and thus its development is hastened, and after each power is developed to some extent, it is tested and perfected in contests and games.

CHANGES WITH AGE AS REGARDS INSTINCTS INVOLVED IN PLAY

The early stages of almost all instincts are manifested in play, and after they are used for the serious purposes of life they are still important factors in more or less playful activities outside of one's vocation.

Perhaps the earliest instinct to be shown in play is that form of curiosity which delights in changes. For this reason, peek-a-boo and other sudden transformations are enjoyed, when repeated over and over again.

A certain interval of preparation before making a final movement which effects the change seems to add to the pleasure. This indicates that the rhythmic tendency is, from the first, an important element in children's play. The early enjoyment of recurrent sensations, movements, and jingles is further evidence of the early prominence of this instinct.

The movements of emotional expression in attitude and voice are often made playfully in the third year, though the expressive instinct has a serious use for them from the first.

The feeling of personal power which can effect changes is an important element in play, as soon as the child gains control of his hands.

As soon as a child attains any form of locomotion, whether rolling, creeping, or walking, he delights in being chased. This, one of the most universally useful of all instincts, appears in play at all ages and is the chief element in nearly all the more popular games, at least before puberty.

Imitative acts, when repeated over and over without purpose, may be considered as playful; hence imitative and dramatic plays are very popular from three to seven, and dramatic play continues in favor much later.

It is hard to say just when the fighting and competitive instinct is first manifested, either seriously or playfully; but competition is the most prominent element in the play of children from seven to twelve. It continues to be a prominent feature in games all through life, but is often subordinated to the group instinct which develops at puberty. Such games as baseball and football, which involve coöperation and subordination of individ-

ual prowess and honor for the sake of the greater prowess and honor of the group (which represents the youth's larger self), are then most favored. This co-operative or tribal tendency is also manifested in connection with predatory instincts at the beginning of puberty, in the formation of gangs for such purposes as hunting, fishing, robbing, teasing policemen, or fighting boys of another neighborhood. Other instincts taking the form of play or involved in play are the constructive, collecting, and æsthetic instincts, all of which begin early and continue all through life, but so far as is known, without any clearly marked period of prominence except that they change their form with age.

PLAY AS A FACTOR IN EDUCATION

Necessity is not only the "mother of invention," but also of a great deal of knowledge of all kinds. Animals, nations, and individuals must learn something of their environment, such as how best to secure food, escape danger, and preserve their species. This is true of adults, but not in so great a degree of young animals and children, for they are, to a considerable extent, screened from the necessities of life by parental care and protection. Without this protection, necessity would be to the young, in their weakness and ignorance, an executioner rather than a teacher.

How shall these helpless and ignorant young ones become strong and wise? Partly through physical development as determined by inner laws governing the growth of the species, and partly through occasional touches of necessity in spite of the screen of parental care, but chiefly through Nature's jolly old nurse, Play,

who charms children into using every power as it develops, and into finding out everything possible about their environment from the heavens above to the earth beneath.

Practically all education among animals and savages is carried on by "Mother Necessity" and "Nurse Play," but among civilized people there is a third teacher which we may designate as "Stepmother Authority." All civilized people select certain truths and activities that they regard as valuable, and induce the children, by various more or less artificial means, to learn and thus prepare for the life they are to live as adults. Such education, if consistent and wise, may be very valuable, but it is artificial. It often does not make use of natural impulses, and is therefore a source of a large amount of waste on the part of teachers and pupils. If the natural educators, necessity and play, were properly utilized, it would be like travelling with the wind and tide, instead of by wearisome rowing in dead calms or against adverse winds.

Since the conditions of life are now quite different from what they were in a savage state, we need a special preparation for life as it has to be lived now. Activities which would develop all the powers possessed by our ancestors in a proper degree would not give the best preparation for the life of to-day. It is necessary, therefore, that truths and activities suited to modern life shall be selected, to the end that children may be properly educated. If the child comes in contact with this artificial environment, necessity and playful imitation will induce him to choose many, perhaps most of the truths and activities that will be of greatest value to him in

life. Yet it is still necessary for authority to do something in the way of selecting and arranging educative truths and activities for the young.

The teacher, in presenting this educative material to the children, may act as a servant of authority and simply require, by rewards and punishments, that children shall take it, or she may try to present it in such a way that the greater portion of the time the child recognizes no other teachers than stern "Mother Necessity" and joyous "Play." If she succeeds in the latter method, play is the chief factor in education during the early years; but gradually more and more place is given to Necessity, until she is the honored director of activity in manhood, or perchance both give place to the twin sisters, Doing and Achievement, who smile alike on work that is as joyous as play, and play that is as valuable as work.

In school, where what is to be done and learned is determined by the course of study, there are yet so many ways of doing and learning that it is often possible for the teacher to arrange exercises so that the dominant powers and instincts of the children at each age shall be called into activity in a playful way. Curiosity supplies all the interest necessary in learning new things; but something else is required in drilling on what has been learned, to produce accuracy, speed, permanency, and facility in using. It is in this part of school work that the play impulse may be utilized to the best advantage. With a little ingenuity every such exercise may be so conducted that it will really be play. It will also be work, in that the child will be induced to perform again and again the same act; but without weariness, because the act is variously associated, and always

agreeably, in new combinations with powers and instincts that are being playfully exercised. All school exercises in which repetition to secure skill and accuracy is necessary, including word drill, numbers requiring rapidity in fundamental operations, factoring, etc., and fixing facts of geography, history, and grammar, may be conducted as games rather than as formal drills.

In conducting such exercises the teacher may or may not call them games, and she must not make them too easy. Most games owe their charm to their difficulty, and nothing is more tiresome and destructive of real interest and ambition in children than doing easy things only. On the other hand, there is nothing so stimulating and inspiring to children as to be allowed to do things that are supposed to be difficult. The more difficult an exercise can be made to appear to children the better, providing they are not deterred from trying, and that it is not really so difficult that they cannot succeed.

The other essential to the success of such exercises is that there shall be frequent changes to give variety. Except for very young children, these changes may consist largely of slight modifications in the exercise that make it more difficult in one way, then in another, as they acquire facility in one phase of activity after another. By such changes interest is maintained through variety and by the constant re-adaptation of the exercise to the growing powers of the child. Adaptations to new powers and instincts are also desirable as the child develops.

In planning educational games for younger children, the muscular, perceptive, and imaginative powers must

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be called into action and tested. For children a little older, thought power may be exercised and imagination and memory power tested. As children grow older, the tests of power may be made more difficult and complex, resulting finally in tests of various powers combined, including thought power. The rhythmic, imitative, and dramatic instincts may be chiefly appealed to in the younger children, then from seven to twelve the competitive instincts, and from ten years on, the coöperative, group, or class spirit. The chief points to be recognized are that the drill be neither too difficult nor too easy, that there be some element in it that appeals to the children, and that variety be introduced in order that there may be no fatigue or loss of interest.

Exercises for Students

1. Mention some plays of animals and children that you think develop their instincts and prepare them for adult life.
2. Describe the recreations of some adults you know, and explain on the theory of play. Why do brain workers engage in manual labor and city people go to the country for recreation?
3. Why is a mason piling up brick, working, and a child piling up blocks, playing?
4. Is one who engages in billiards or bowling to secure a prize of value, working or playing? Why?
5. Is drawing or singing work or play for you? Why? Is any of your work really play to you?
6. Mention games and sports that are especially valuable in preparing for work, giving reasons.
7. Yoder, in his study of the boyhood of great men, found that most of them were noted players when boys. How do you interpret this?
8. Mention several amusements as distinguished from play, and indicate their value, if any.

9. Does the statement, "A teacher should interest her pupils," mean she should amuse them, or what does it mean?

10. What plays and games did you most enjoy at different ages? What games are most popular among children you have observed at different ages? Determine as well as you can what characteristics of various games make them popular, taking into account the freedom of the game, the powers used, and the instincts involved.

11. Mention things some animals you know learned by necessity. Mention things you and other individuals learned because it was necessary. Mention differences in knowledge possessed by the people of different regions, produced by conditions under which their life must be maintained.

12. Which has been the larger factor, necessity or the play impulse in developing practical knowledge? The sciences? The arts?

13. What connection is there between the statements that we should utilize the play impulse of children and that we should appeal to their interests?

14. Mention indoor gymnastic plays that are good for recreation and physical development. When the teacher directs each movement, are gymnastics a rest or another form of work?

15. Describe games that may be used in numbers, arithmetic, geography, and history in certain grades, and indicate changes that may be made as the children progress.

Suggestions for Reading

On the general theory and value of play, read Spencer, *Psychology*, Vol. I, sec. 50, and Vol. II, chap. ix; Groos, *Play of Animals*, especially pp. 1-81, and the preface by Baldwin; Stanley, *Psych. Rev.*, Vol. VI, pp. 86-92; Allen, *Univ. of Colo. Studies*, Vol. I, pp. 59-72; Carr, *Univ. of Colo. Studies*, Vol. I, No. 2, pp. 1-47; Blow, *Symbolic Education*, chap. v; Chamberlain, *The Child*, chap. ii. and on kinds of play, Groos, *Play of Man*.

On development of the play instinct, besides records of the play of infants in Preyer, Moore, Shinn, Tracy, and of young animals in Mills and Groos, see Monroe, *N. E. A.*, 1899, pp. 1084-1090; Crosswell, *Ped. Sem.*, Vol. VI, pp. 314-371; Gulick, *Ped. Sem.*, Vol. VI, pp. 135-150; Burk, *N. W. Mo.*, Vol. IX, pp. 349-355;

Hall and Allen, *Ped. Sem.*, Vol. IV, pp. 129-175; Hall, *Scribner's Mag.*, Vol. III, pp. 689-696; Barnes, *Studies in Ed.*, Vol. I, pp. 171-174.

On the use of play in education, Johnson, *Ped. Sem.*, Vol. III, pp. 97-133, Vol. VI, pp. 513-522; Felker, *N. E. A.*, 1898, pp. 624-630; Powe and others in *N. E. A.*, 1901, pp. 502-532; Wiggin, *Children's Rights*, pp. 25-67; Harrison, *Child Nature*, chap. iii.

For descriptions of games to be played, see Lucas, *What Shall We Do Now?* Newell, *Games and Songs of American Children*; Chesley, *Indoor and Outdoor Gymnastic Games*.

CHAPTER X

DEVELOPMENT OF ADAPTIVE INSTINCTS— CURIOSITY

FUNCTION OF CURIOSITY

FROM the moment that the sunlight dancing on the wall, or the little hands waving before the eyes hold the infant's gaze, till the time when the latest discoveries in science are eagerly examined by the savant, curiosity in some form is daily and hourly a factor in human action and thought.

Curiosity is even more omnivorous than imitation. It is at first almost entirely unselective, except as stronger stimuli force themselves upon the attention. It may be described as an appetite for new experiences. In infancy everything is new, hence everything is interesting. Curiosity is early manifested in a tendency to prolong a sensation, as by gazing at a new object; or to reproduce it, as when a sound is made again; or to act so as to get one or more additional sensations, as when an object seen is felt of; or to find the relation of one sensation to others, as when a child discovers that touching an object being struck, deadens the sound. Later, similar things are true of ideas.

By means of curiosity a child is brought into intimate relation with various phases of his environment, instead of simply those that minister to his existence. Every-

thing around him is made a part of himself. The trees, the hills, the birds, the people of his home surroundings, are compared and related to what he finds in new surroundings.

The greater the knowledge of environment gained through curiosity, the greater the possibility of adaptation to environment, as occasions arise involving applications of knowledge that have hitherto been useless. Thus a child who has learned a word through mere curiosity may be able to use it as a means of getting what he wants, or one who has learned through mere curiosity that wood floats, wasps sting, plants grow, fire burns, etc., may on occasion use the knowledge in a practical way. Other instincts tend to produce the proper response to present stimuli, while curiosity is continually preparing for the right response to conditions that *may* be met in the future. It lays up great stores of knowledge that serve as a basis for useful reactions. If man never learned anything before he had occasion to use it, he would suffer in countless ways from improper and delayed action. Necessity is a great teacher, but curiosity is a greater teacher in early life, because even in early infancy it gives lessons that prepare for life. It does not inflict immediate and severe punishment as does necessity, but it gives present joy and prepares for great rewards in the future.

The race as well as the individual has learned by means of curiosity. In its highest form curiosity has led to many scientific discoveries that were of no immediate practical value. ~~Sooner or later, however, these~~ abstract scientific truths nearly always find valuable practical applications.

CURIOSITY, ATTENTION, AND INTEREST

Curiosity, as an instinct or impulse, produces in consciousness a concentration of activity called attention, and a feeling accompanying the act, called interest. Studying attention and interest is therefore the chief means of studying curiosity, since they are largely the result of curiosity, though other instincts and much experience may also be involved. The simple mental state of attention to the *act* of eating, or of drawing back from a dangerous object, is the result of the feeding and the fear instincts; but attention to the *taste, feeling, or appearance* of food, or the *characteristics* of the object of fear, is due mainly to curiosity. Often there is a prolonged period of attention and interest, before action in the way of eating the food, or backing away from the fearful object, or of approaching for closer investigation results. Curiosity may, therefore, either support or oppose the attention and interest excited by other instincts. For most instincts, however, especially for play and imitation, it is a forerunner and supporter in the sense of leading to a closer examination of objects, though this often results in checking the usual instinctive mode of reaction to those objects.

The essential characteristic of a stimulus that arouses the instinct of curiosity is that of novelty. Since, however, a stimulus must have a certain degree of intensity to be effective, and as everything is at first new, it is the louder sounds, the brighter colors, and stronger contrasts, as, for instance, the dark hair and white forehead of the mother, that secure the infant's attention when he begins to take notice in the latter part of the first

quarter year. The sensations that are repeated, however, soon cease to be noticed, through loss of novelty.

Close observation shows that certain objects, sounds, or colors are attended to longer and a greater number of times than others of equal or even greater intensity, objectively speaking. This suggests the well-known fact that stimuli are effective according to the sensitiveness of the organism to them, rather than according merely to their objective strength. A slight touch on a boil or a corn is a stronger stimulus than a hard blow on some other part; in a similar way individuals differ greatly in sensitiveness to the same sounds, colors, and objects. As a child's instincts develop, he becomes more sensitive to certain stimuli, consequently his curiosity is more readily excited in some directions than in others. When a child's competitive instincts are strong, he likes to hear of contests; and when he has been flying kites, he likes to hear how children in other countries and scientific men fly them. Children's interest or curiosity, therefore, changes with the development of new instincts and with new experiences.

The tendency to imitation and play heightens the interest for a time by helping to disclose new characteristics of the object, then decreases it by effectually removing the essential element—newness. Though curiosity is thus continually destroyed by the results of its own action assisted by play, the knowledge thus acquired becomes the basis for a fresh growth of curiosity and play a little later. For example, colored cubes lose their interest when played with a great deal, only to regain it again and again as increased experience with other things prepares for new uses and the consequent

observation of new characteristics. The child, after losing his interest in looking at and touching them, enjoys placing them in rows, or on top of each other, in building houses of them, counting their sides and curves, comparing them with other solids, and noting their weight and material as compared with other cubes, and finally in studying geometrical relations of all kinds. Thus familiarity with the shape and composition of the first cubes prepares the way for noticing the characteristics of blocks differently shaped and composed, and also lays a foundation in experience for a study of mathematical relations.

Since nothing is noticed as new except as it differs from the familiar, every familiarity prepares for a fresh novelty. The materials produced by the self-destructive acts of curiosity therefore furnish a rich soil for the growth of a more vigorous interest. This growth of interest through increase in knowledge may be illustrated mathematically. If you know but two characteristics of an object, you can compare these with two of another object; but if you know four, you can compare with four and thus make sixteen comparisons; while if you know eight, you can make sixty-four comparisons, or thirty-two times as many as when you knew only two. The increase is therefore in a geometrical ratio. To him who gains knowledge more interest and knowledge is continually given.

Curiosity has therefore two means of growth: (1) through new stimuli gained by changing or enlarging one's environment, and (2) through increasing knowledge of familiar objects by the discovery of new relations. From the psychological point of view the problem of in-

terest is concerned chiefly with the effects of *experience*. Psychology shows how interest may be promoted by a changing or enlarging environment, and by increasing the knowledge of things already in the environment.

From the child-study point of view, however, the problem is one of *development*. It is not to find how any particular kind of desirable interest may be increased by external influences, but to discover at what stages of organic and instinctive development the child is especially sensitive to certain phases of his surroundings, or, in other words, to determine what interests, if any, are naturally strongest at each stage of development. This is a very difficult matter because, as we have already seen, previous experience is such a large factor in interest that it is hard to tell what is interesting because of inner conditions of development, and what is interesting because of experience and training.

CHANGES IN CURIOSITY WITH AGE

Curiosity has so many forms, and the impulse toward the new so frequently alternates in children with the love of the familiar, as shown in love for old stories, games, etc., that the general course of development is hard to trace. There are times when nothing but something new will satisfy the child, then again, he wants nothing but the old, the familiar. Such changes, though irregular, are frequent enough to suggest that curiosity impels to the acquiring of a system of knowledge of certain phases of the environment, then to a reaching out after a new environment. Play and imitation make the more obvious characteristics of this new territory familiar; curiosity then leads to a fresh excursion into

the new, but there is often a return to the old, which is then reviewed in the light of the new experience.

Early in life, and whenever a new object is introduced, the kind of curiosity or interest excited by the mere fact of newness may be called *empirical*. Later, the same object excites curiosity, not because of the new sensations or ideas it gives, but because of the desire to trace the relation of some of its characteristics to those of other objects. The curiosity or interest thus excited may be called *speculative* or *relational*.

There can be no doubt that the curiosity of children is largely empirical, partially because there are more new things for them to experience, while adults who have more knowledge to relate to whatever they perceive are more concerned with speculative interests.

Before a child begins to talk, his interest is mainly in getting new sensations and noting their relations; but when the instinct of expression awakens, names for experiences are sought in the constant question, "What is that?" which is satisfactorily answered by a name. After various objects and acts and the names for them become familiar, the interest changes to their relations, and the constant questions are: "What is that for?" (use), and "How do you do that?" or "What do you do that for?" (how and why). Again, for a time, interest goes from objects and acts to their origin, and the constant question is, "Where did that come from?" Later, "Why?" questions predominate, but often with a little different meaning. They refer less to subjective reasons for doing a thing and more to common laws or general truths, *e.g.* "It is dark because the sun has gone down." Interest now is often concerned with the applications of

truths that have previously been learned. "Is the sun down?" — "No." — "What makes it dark then?" This stage is reached in the third or fourth year. At about this time every question regarding a general truth is succeeded by another "Why?" till the puzzled adult reaches what the persistent little questioner accepts as an ultimate reason, or the circle is completed and the first answer is given, or in exasperation the child is told to "keep still."

From the earliest days of taking notice, movements and actions are the strongest stimuli to curiosity. This remains true all through life, but investigation shows that it is less so in the later than in the earlier years of school life, and most so before entering school. Children of two years use nearly twice as large a proportion of action words as adults. Professor Shaw found that in school the younger children, when asked to tell what they thought when certain words were named, mentioned actions more frequently than the older ones; Barnes, that they were more interested in the use of things; and I have found that if asked to give a list of words younger children give more action words than older children and adults. Vostrovsky found that actions were prominent in children's own stories, and Köhler, that they remembered the action of stories told them better than descriptive details.

As to other interests, Vostrovsky found that in children's stories names, appearance, time, place, and possession are prominent; while Barnes found that in history they questioned most about cause and effect, who, why, personal detail, general detail, and least about time and truth.

As to objects of interest, various studies of children's reading and of their spontaneous drawings indicate that they are interested, in the earlier grades, in colors rather than in form, and in animals and children rather than in adults.

As to the mental powers appealed to, Barnes found critical inferences most numerous at twelve and thirteen, and Lindley, interest in reasoning and puzzles greatest at twelve.

At about twelve, interest in history greatly increases, as all studies of reading interests show, probably because history supplies in a representative form new environment and experience, but more particularly because the social instincts direct curiosity to the study of groups of people. A little later, moral and religious questions have a great fascination, probably because the regulative instincts are developing. *Æsthetic* interest also increases at this time.

Since curiosity is modified by every new instinct, changes in curiosity may serve as signs of the development of new instincts. Curiosity serves as a guide by giving complete knowledge of everything connected with satisfying the instinct that excites it. The boy's interest in fables prepares him for wise action in the pursuit of his individual ends, and the youth's historical interest in groups of men, for performing his part as a social being.

CURIOSITY AND EDUCATION

Long ago Plato said, "Curiosity is the mother of all knowledge;" but too often since then she has been regarded as merely the mother of gossip and scandal.

The latter, however, are illegitimate children, resulting from poor feeding and union with small and unworthy passions. The legitimate offspring of curiosity are interest, learning, science, and love of truth.

Children enter school as animated interrogation points, and instead of having their mental hunger gratified, they are stuffed with knowledge they have not asked for, and required to answer instead of being led to question, until their intellectual appetite is dulled and only the most stimulating diet appeals to them. They are led to study only by the desire for approbation, or by some form of compulsion or reward. It is not the truth they are after, but the words and acts that will satisfy the teacher, hence the slightest change in her expression or tone of voice often leads them to modify their statements.

Unfortunately, curiosity and interest, like play, are often identified with amusement, by many teachers, when as a matter of fact, healthy curiosity is one of the strongest stimuli to effort. Of the two ways of exciting curiosity, that of giving new experiences by showing or describing something never seen before, and that of directing attention to unobserved qualities or relations of familiar objects, the first is unfortunately the mode more often used by those who try to interest children in their lessons. In many cases, therefore, teaching has become nothing more than the art of amusing. The result is that all the sweetness is taken out of a subject before there is anything of value learned about it, and subsequent teachers find it almost impossible to interest the children in these unpalatable and half-chewed materials. Not only has the delightful flavor of newness

been removed from the subject, but the mental habit of taking rich food instead of working for daily bread has been cultivated, until in many ways the children are, intellectually, pampered weaklings. Their curiosity is aroused only by intellectual doses highly seasoned with the new and marvellous, administered by teachers who know of no other way of appealing to interest.

The old-fashioned discipline of rod and ferule, wielded according to fixed rules, compelled the scholastic prisoners to learn their trade, and thus effective intellectual workmen were often turned out, who had performed difficult and unpleasant tasks till they had no thought of hesitating at any drudgery. Unwise attempts to carry out the imperfectly understood doctrine of interest have developed intellectual laziness and repugnance to effort.

Properly understood and applied, however, the doctrine of interest will emancipate, not enervate, children intellectually. Just as a free laborer does a vast deal more work than the most closely watched slave, and does it with a pleasure and self-respect the slave can never feel, so does the child, working under the stimulus of interest, accomplish far more intellectually and morally than the uninterested urchin who slaved at his task under the watchful eye of the old-time teacher.

Interest that is educationally valuable is not that which pleases and amuses (though a little such interest is helpful, especially with young children), but that kind of interest which causes effort to be put forth in order to satisfy the hunger for knowledge. The real test of interest is not how much *pleasure* do the children get out of the study, but how much *effort* do they put forth in pursuing it. Curiosity, like play, may be the stimu-

lus to an immense amount of what would otherwise be drudgery.

The conditions most favorable for rendering curiosity a strong motive to effort are (1) the perception of the relation of what is being studied to familiar and interesting experience and knowledge, (2) receptivity to the kind of knowledge being gained because it is suited to the stage of development the individual has reached. Many other things are helpful, but these are the most important essentials. How to bring about the first condition is the problem of psychology and pedagogy, while the second condition can only be secured through child-study investigations.

The purposes of education must determine what shall be taught; psychology, how or in what order subjects shall be taught, that each subject and part of subject may form a basis of interest for the next; while child study must say when and how certain teaching shall be given, in order that the natural curiosity and interest of each age may be utilized. The teacher should use her skill in associating studies with the child's instinctive tendencies at the time, and with his more recent activities, that there may be no lack of natural, healthy interest regarding every subject as it is pursued.

If properly appealed to, curiosity alone is a sufficient motive for the invasion of every fresh field of knowledge; while imitation and play will supply the practice and drill necessary to insure continued possession of it. These instincts may very properly be supported by others, especially the desire for approbation in the earlier years, the pleasures of competition, and the desire for results, in the later years of school life.

Exercises for Students

1. Has the search for scientific truths usually been carried on in order that they might be directly applied in practical life, or merely that the truth may be known? Mention some such truth that has proved useful.
2. Give illustrations of knowledge of environment, gained by yourself or by children through mere curiosity, that will prove or has proved useful later.
3. Illustrate how stronger or newer stimuli excite curiosity.
4. Give examples of children who are especially curious regarding certain objects, acts, or lines of thought.
5. Give illustrations of the relation of curiosity (*a*) to other instincts, (*b*) to past experience.
6. Illustrate from your own experience or observation how increase in knowledge develops new phases of interest.
7. Show how interest may be increased through new experience gained by enlargement of mental environment, without changing one's location.
8. Illustrate further how increased knowledge of familiar things has increased the interest of yourself or of others.
9. Give illustrations of children's interest (*a*) in the old, (*b*) in the new, (*c*) of fresh interest in the old, after study in other lines.
10. Can you determine what were the causes of your interest in certain kinds of reading at different ages?
11. Give instances in which children seek to give the answers the teacher wants, rather than to find out and state the truth.
12. Illustrate what children will sometimes do of themselves in the way of investigation and study when curiosity is excited.
13. Give illustrations of how teachers may or have connected topics with recent experiences and interesting activities outside of school.

Suggestions for Reading

On curiosity as an instinct, see Lindsay, *Mind in the Lower Animals*, pp. 252-256; Ribot, *Psychology of the Emotions*, pp. 368-379; Groos, *Play of Animals*, pp. 214-222; Morgan, *Comparative Psychology*, pp. 297-298.

For researches and discussions of the interests of children, read, besides the observations on infants, Barnes, *Studies in Ed.*, Vol. I, pp. 15-17, 43-52, 83-93, 203-212, 222-227, Vol. II, pp. 338-351; Shaw, *Ch. S. Mo.*, Vol. II, pp. 152-167; Taylor, *Ped. Sem.*, Vol. V, pp. 497-511; Laing, *Ed. Rev.*, Vol. XVI, pp. 281-390; Wissler, *Ch. S. Mo.*, Vol. IV, pp. 139-146; *Ped. Sem.*, Vol. V, pp. 523-540; Clapp, *Pop. Sci. Mo.*, Vol. XLIV, pp. 799-809; Griffith, *Ch. S. Mo.*, Vol. IV, pp. 285-287; O'Shea, *Ch. S. Mo.*, Vol. II, pp. 266-278, or *N. E. A.*, 1896, pp. 873-881; Luckey, *N. E. A.*, 1897, pp. 284-288; *N. W. Mo.*, Vol. VII, pp. 67, 96, 133, 156, 221, 245, 306, 335; Harrison, *Child Nature*, chap. ii; Compayre, Vol. II, pp. 17-28.

CHAPTER XI

DEVELOPMENT OF INSTINCTS—REGULATIVE

I. MORAL INSTINCTS

PREPARATORY STAGE OF MORAL DEVELOPMENT

THE child's instincts are nearly as independent of each other as are individuals in the social organism. Each instinct stimulates to action for its own gratification, just as each man seeks his own interests. The individual in society learns that certain actions are undesirable, because they result in other persons performing acts that are unpleasant to him. Out of such experiences grow the laws governing society. The child finds that some instinctive acts are more pleasurable than others, or that one kind of act interferes with another, and thus learns to regulate his conduct. He is also impressed less directly with their undesirability by the attitude of other people. For example, a child who was drinking water in such a way as to get his dress wet, said, "I don't care if it does run down on me." Mamma, "But I care; it isn't nice, and if you do it any more I shall take your glass away." Child, "I won't do it any more then, never."

The child is at first neither moral nor immoral, but unmoral. He is acting according to his natural instincts when biting and striking his mother as much as when he is hugging and kissing her, and no more. In both

cases he acts as his instincts and feelings prompt, and to him one act is just as good as the other. Experience, however, soon teaches him that one kind of act brings pleasant results in the way of approbation and favors, while the other brings him disapprobation and perhaps punishment. He thus learns that some acts are better than others. "Better," however, means to him merely more pleasurable in results to himself, not morally better, for of that he has no conception. He is not kind or cruel in a moral sense, neither is he truthful or untruthful, honest or dishonest; but he readily learns to be whichever secures him the most advantages.

What habits of action he shall form, or what he shall come to regard as right or wrong, is wholly a matter of experience and training. The law of his nature at this time impels him to conform to his environment in such a way as to get as much pleasure and as little pain as possible. For about a dozen years this individualistic law of life holds almost complete sway; hence this is the period during which the child is naturally unmoral. It is distinctively a *preparatory* stage of moral development; yet it is not for that reason any the less important. The foundations of a future less individualistic and more altruistic moral life are being laid.

MORAL TRAINING DURING THE PREPARATORY STAGE

In this stage should be developed: (1) regularity of physical and mental processes, (2) the consciousness that it pays to do right, (3) the tendency to inhibit impulses, (4) to endure hardships, (5) to wait for future good, (6) to take pain before pleasure, (7) to seek the satisfaction of higher instincts, (8) to form right habits,

(9) to act from increasingly higher motives, (10) to form right ideals, (11) to obey, (12) to exercise self-control.

(1) Since *regulation* of action is an important phase of moral training, and since unconscious actions influence conscious choices, the preparation for a moral life may begin in infancy. The foundations of morality should be laid by the development of regularity in the more or less unconscious organic processes of sleeping, eating, and eliminating waste materials from the body. Parents should therefore seek to establish regularity in these respects, not only as a condition of health, but as a solid basis for the development of a stable, moral character.

(2) As soon as the infant notices the results of his actions, *consciousness* may be utilized in the development of moral habits and the acquisition of moral truths. In doing this one must see to it that right actions are followed sooner or later by pleasurable results to the child, and wrong actions by disagreeable results, because both blind instinct and acute intelligence impel to the repetition of actions having pleasurable results, and the avoidance of those whose results are painful. The child should come to realize that most fundamental, though not the highest, of moral truths, "It pays to do right."

(3) The first step in self-control may be taken by getting children to *inhibit*, for a short time, organic and instinctive impulses. An assuring word that causes a child to stop crying for food till preparations for giving it to him are completed, may become a sign to him that if he is quiet his wants will soon be satisfied, and the time of waiting may be gradually lengthened. Care

must be taken, especially at first, that the interval between assurance and satisfaction is short, or crying will be renewed, and the word intended to quiet will become instead the signal for a period of crying. The cry of the infant is a most useful, instinctive mode of obtaining parental help, but its function is to attract attention of parents, rather than to force them, by its continuance, to respond. The latter function is, however, very readily taken up if a long period of crying is allowed to precede the satisfaction of wants. Moral development is promoted by getting the child to inhibit the crying impulse as soon as possible, by quieting words and prompt relief, if they are to be given at all.

(4) Repressing impulses and *doing disagreeable tasks* should also be encouraged by desirable results following such actions. The child who can be induced to stop crying when hurt, face danger when afraid, or to continue carrying a heavy load when tired, by desire for the approval he will get as a "brave boy," is gaining in moral development. When a child can be induced to put forth effort to control self or accomplish any task through the desire to satisfy the competitive instinct by winning, he is also developing morally. If, however, he gains advantages over another, not by effort, but by yielding to the natural impulse to cry and fret about the success or advantages of others (as when jealous), there is a development of undesirable impulses instead of control, and the effect is demoralizing.

(5) As children grow older they should learn that it often pays to *delay* the gratification of an impulse for a time, in order that a greater pleasure may be experienced later. "If you eat now you can have bread only, while

if you wait until dinner is ready you may have other things." "If you will keep quiet till I get through, you may then look at this and ask as many questions as you wish." "If you do not buy candy to-day but save your pennies, you can get a doll next week." "If you rest awhile and wait till the others are ready, I think you will enjoy your game more."

(6) "*Work before play and pain before pleasure,*" is a good motto. If a disagreeable task is to be performed or pain suffered, in connection with a pleasure or reward, it is always better to have the pleasure or reward last, since anticipation lightens the pain and effort, perhaps even making the act pleasurable, while the pleasure afterward is enjoyed all the more because of the effort by which it was obtained. If the order is reversed, pleasure is lessened by dread, and pain increased by thought of previous pleasure. If every child were led to form the habit of enjoying reward only after earning it, the world would be vastly happier and better. The pampering and demoralizing tendency to get what has not yet been earned, by going in debt, gambling, or speculating, is the natural result of a childhood that has been allowed to take the sweet first, then dodge the bitter or to take it with much fussing and grumbling.

(7) The conscious states or *motives* preceding action, as well as those succeeding, are significant from the dawn of volition, and increasingly important as an essential element in moral acts. As soon as an action becomes purposive rather than blindly impulsive, the aim is the satisfaction of some instinct. Since the kind of instincts whose satisfaction is most sought, determines in a large measure the moral character of an individual,

it is important that the habit of seeking to satisfy the higher instincts should be developed as far as possible even in early childhood. If a child chooses to gratify the higher social impulse of desire for approval by offering the best to others, instead of gratifying the lower individualistic impulse to take the best for himself, he is forming a most excellent moral habit. If, however, his desire for approval leads him to say what he does not believe, in order to secure the favor of others, the effect is demoralizing.

(8) It must never be forgotten that the *formation of habits* is the important thing in the preparatory stage of moral development, since they will ultimately determine motives and ideals. If none but the lowest motive will produce right action, that motive should be appealed to in order that the right action may be performed. Again, no motive, however high, should be appealed to, if it is certain to fail to call forth right action, because the separation of habits and ideals thus produced is sure to disintegrate moral character. The general rule to be followed is, *be sure to secure right action even if a low motive must be appealed to, but always appeal to the highest motive that will be effective.* If children are forced, without arousing too much antagonism on their part, to do as they should for a sufficient length of time, the tendency to act in that way becomes stronger than to act in any other way. They also come to take pleasure in doing what they have developed a tendency to do, though at first it was not agreeable. On the other hand, if matters are so arranged that right doing always has pleasanter results than wrong doing, right actions are consciously chosen and more quickly become habitual.

Moral progress is measured, not only by increase in the number of right acts, but by increased tendency to perform acts from higher motives. A child who is polite for a long time, through fear of punishment, may remain polite because of the social advantages thus secured. Later, he may be polite to one outside of his circle from the kindly motive of encouraging him, or from a genuine feeling of brotherhood. In this, as in other cases, a habit formed from a low motive may make it possible for a higher motive to be effective. On the other hand, the habit of politeness may be more quickly and firmly established by appeal to the imitative instinct and the desire for approval.

(9) In general, the motives to action may be *ranked* as follows: the pleasurable, as higher than the disagreeable of the same general kind, and the instincts to be satisfied, in this gradation—individualistic, adaptive, parental, social, regulative. Of course some forms of each of these instincts are higher than some in a class above them, for instance, the social desire for approbation is not only lower than the social desire to be helpful to others, but also lower than the parental desire to care for children; hence the ranking given above is subject to many changes, according to the form of each instinct involved.

Any substitution of a lower motive for a higher that has hitherto been effective, is demoralizing. A man is therefore degraded by voting his party ticket for money or by receiving pay for granting justice. Personal service is often unjustly regarded as one of the lowest occupations, probably because those engaged in it are supposed to be actuated wholly by individualistic motives,

in performing acts that are, in their nature, social. Keeping a boarding-house is not dishonorable, but it is often hard for one who has hospitably entertained friends a great deal, to receive guests for pay, without feeling that she is in part doing for a lower motive what she has been in the habit of doing only for a higher motive. Ministers, doctors, and teachers are retrograding morally if they are thinking more of the pay they are to receive, and less of the good they are trying to do. Mechanics and merchants are advancing morally as they think more and more of doing their work well and of rendering good service to the world.

Undoubtedly, most acts are performed from mixed motives, but usually one stands out in the individual's mind as the controlling factor. When an individual is consciously acting from a high motive, it is either insulting or degrading to try to make a lower one prominent in his consciousness. To offer for social favors similar favors is all right, but to let another understand that he will gain financially by social favors or by philanthropy is either insulting or demoralizing.

To impute a higher motive to an act that is really being performed from a lower, is sometimes almost equally bad in its effects, because the individual is often thus led to believe that he is really acting benevolently, when his act is wholly selfish. Men who pay a low price for a good supper, therefore, often pride themselves on their benevolence to the church or other cause.

(10) *Ideals* are helpful in childhood in forming habits, but are not usually strong enough to be depended upon to produce right action, except as they are founded on well-established habits or supported by expectation of

desirable consequences. For example, a little girl, with clear ideals as to being helpful, thoughtful, and pleasant, and a genuine desire to be so, rarely holds herself to those ideals a whole day, but did so for over a week, when she thought a promised hammock was not likely to come till she had been pleasant for some time. Unconscious habits of right action, as well as pleasurable results of acting from higher motives, are important factors in the building of effective moral ideals. The training given in the preparatory stage should not be concerned so much with the formation of conscious ideals, which at this time are usually very changeable, as with the habits and feelings that underlie them and make them prominent and effective forces in the next stage of moral development.

(11) *Obedience*, which is regarded by many as the chief virtue of childhood, is important not for its own sake, but for what it involves. It necessarily involves inhibiting and controlling impulses of all kinds, and produces habits of acting according to law. This is important, since in a state or an individual any kind of government or law is likely to be better than anarchy. These advantages result only when the one who enforces the obedience is entirely consistent, for otherwise the advantages of occasional inhibitions are neutralized by the fact that no settled habits of action are formed.

Obedience to *personal* authority is in reality conforming to a more or less artificial environment, and it fits for a useful and effective life in proportion as this artificial environment, which inflicts pain and pleasure for the various acts performed, is in accordance with natural laws and moral ideals. If it results in

making good acts painful and evil ones pleasurable, and in hatred for law, it is distinctly demoralizing in its effects, as is also the case when only lower motives for obedience are appealed to. If, on the other hand, the personal authority is consistent and natural, so that obedience involves little more than conformity to the natural environment of the child, the effects are decidedly good, because right habits are more quickly and effectively developed, and natural results that would be too intangible or remote to be effective are made real and immediate by substitution. Authority should prevent the child from performing acts whose consequences would be very serious or fatal. If they are immediate, but not serious, he should be warned, then allowed to perform the act and receive the natural consequences. For example, a child should not be prevented from touching something hot, but he should not be allowed to eat poison.

The *person* who exercises authority is also an important addition to the child's environment, and exercises great influence for good or ill by his personality, as well as by the way in which he exercises authority and calls attention to higher or lower motives of conduct.

(12) It should be clearly recognized by every one in authority that obedience is only a means to an end, the end always being *self-control*. Strict control by another, till habits of action are formed, is often, for a young or perverted child, the best preparation for self-control, for it makes his habits his allies, so that he has what he lacked before—the power of controlling himself. Arrest of development, however, always results if the power of self-control is not given

a chance for exercise soon after it is developed. Authority should enforce obedience in one field of action after another, and then leave the child free to control the field that has been conquered. Obedience is a temporary and immature virtue, which becomes mature and lasting only when it grows into free self-control, by appropriating outer laws and making them inner standards of conduct.

TRANSITION STAGE OF MORAL DEVELOPMENT

Up to about twelve years of age the moral condition is almost wholly the result of environment and training. These may make the child into the semblance of an angel or an imp, yet he can be neither. He is not essentially good or bad, because though his actions have that form, they have not that spirit. Every action is the result of an impulse, a habit, or a choice, that has for its end the pleasure or advantage of self in some way. This is the one law governing the child's conscious action, whatever instinct or motive is involved, and however remote or concealed the advantage to self may be. If well trained, the child has learned to find his pleasure in acts of politeness and kindness, and if ill trained, in rudeness and cruelty; but in either case the action is fundamentally for his own ends, not for the good or hurt of another.

With the dawn of pubescence, however, a new instinct—the parental—emerges. In its very nature this instinct impels to action for others rather than for self. The inner law that says, "Act for yourself," is now for the first time opposed by the law that says, "Act for others." The choice is no longer merely between possible

advantages for self, or ways of getting them, but between acting for self or for others. Kind and selfish acts are now, for the first time, morally kind or selfish, for they represent the free choice of actions for self or for others. The individual has begun to live the life, not merely of the individual, but also of the race.

If he has been prepared for this by coöperative games in which he acts for the good of the group rather than for his own exaltation, and if his training has been such that he already has the habit of acting for the advantage of others, then there is no break in the moral progress. Figuratively speaking, the parental instinct infuses life into the moral mechanism, the wheels revolve more rapidly, and the engineer begins to direct its course according to his own judgment, instead of merely obeying orders or following impulses. The youth is no longer merely an individual, but one of the world's forces, and he feels the obligation, not merely to live, but to do. It is no longer himself and the world, but himself as a part of the world. He begins to feel as never before his own responsibility for that self. The old impulse to get all he can for self is partially replaced by the impulse to *be* all that he can for himself and to *do* all that he can for the world.

This is the age of idealistic imitation and of ideals. Works of art, heroic lives, and religious ceremonies take on a new meaning. Ambitions and ideals are no longer dependent on the immediate environment, but the most beautiful, noble, and high are chosen from the larger world of history, literature, and art. In the earlier stage of this wider life, the most attractive ideals are frequently very crude. Boys are most appealed to by

action, power, and courage; hence not merely history, but all kinds of stories of adventure in which marvels of skill and bravery are shown are their delight. Such types of character are sometimes imitated regardless of the moral character of the actions in which they appear.

With girls, there is something of the same attraction toward the strange and wonderful, but the more passive virtues of love and devotion under trying circumstances are most interesting; hence romantic stories are much in favor with girls at this age.

This is a period of change in attitude toward ideals, which are for a while often contradictory and variable. It is a time of transition from personal authority to abstract law, during which there may be considerable lawlessness, especially in cases where control has been entirely external. The rules of the game and the unformulated rules imposed by the customs and public sentiment of the class, school, gang, or society, are usually observed with the greatest care. The social customs of polite society and fashion in dress are often first despised and flagrantly violated, then respected and most slavishly followed. Laws of state come to be regarded in a different light, and principles of morality take on an entirely new meaning. Laws of all kinds are viewed, not simply from the standpoint of personal interest, but as a part of the larger life of the world now revealed.

MORAL TRAINING IN THE TRANSITION PERIOD

There can be no moral action where the individual does not have the chance to choose for himself; hence if genuine morality develops at this period, it must be through *self-direction*. The second essential is plenty

of *ideals* for imitation ; the third, *good companions* ; and fourth, wholesome *public sentiment* in school, class, and social circles.

(1) *Self-direction* does not mean that no authority shall be exercised over the youth, but that the authority shall not be merely a person arbitrarily dictating and enforcing what the youth shall do. Personal authority, however valuable in a previous stage, especially in the early years, must now be relaxed, and example and advice, preferably in the form of suggestion, substituted. There is never a time when personal authority of parents and teachers counts for so little, and personal character for so much. Arbitrary authority is ridiculed, evaded, defied, or shame-facedly yielded to as unworthy the developing man. At the same time the youth is a most ardent hero-worshipper and imitator of what to him is ideal.

Commands and rules should be based on general principles, and should not be numerous or cover minute details of conduct. This is the time of all others when outer laws should be adopted as inner standards of action, and are likely to be, if they are founded on broad general principles and prepared for by previous training.

Under wise guidance, this is also a favorable time for giving practice in making and executing laws, or, in other words, for the introduction of some measure of self-government. At this age, when personal authority is losing its power, when the attitude toward law is changing, and when principles of action for life are being chosen, nothing will help more in producing regard for laws and a feeling of obligation to obey them than experience in making and executing them. Responsibility

of some kind in which the youth has perfect freedom of choice, but must take the consequences, is the kind of freedom needed, rather than that in which he is free to choose, but is at the same time shielded from the results of his choice.

(2) The *ideals*, early in this stage, must be personal. Reading is the great source of them at this time, especially for boys. Nearly every boy, however, finds one or more heroes in his local environment, usually in an older man or sometimes in a woman. Some of these may be partial ideals, as of strength or skill or beauty or knowledge; but one is likely to be a moral ideal, the embodiment of all that is noble and worthy. Girls are almost sure to find some such ideal in an older woman, and often the feeling inspired is not unlike that felt later for a lover.

The choice of such personal ideals by youths and maidens cannot readily be directed and controlled, and one can only hope that it will be fortunate. The actions of such chosen demi-gods and goddesses are often, unconsciously to themselves, the source of keenest joy and grief to their admirers, whose whole future life is not infrequently moulded by them.

Training in the choice of moral ideals is best given by presenting instances of heroism and virtue in history and story, and dwelling on them long enough to stir admiration but without any preaching. Formal statements and discussion of general principles of morality are also often valuable as giving youths clearer and better standards of action. Care must be taken not to interfere with freedom of choice by exhortation and urging; for in their very nature ideals must be freely

chosen by the individual because they appeal to something within him, and not because somebody else finds them good. The teacher's art consists in presenting them in a form likely to be attractive. If principles of conduct are stated by a hero, or given as having been practised by a hero, they are more likely to be accepted.

Every youth should have opportunity and encouragement to do something toward carrying out his ideals. If, to do so, he must sacrifice self to some extent, all the better. This is preëminently the time for developing altruism in deed as well as in thought. The youth should now attain to the higher stage of doing right even when it seems sure not to pay.

(3) *Companions*, especially chums, are chosen by youths and maidens themselves, and only incidentally can the educator determine these choices. Boys more often have a group of companions, and girls a single chum, with whom they wish to be every moment while the intimacy lasts, which may be for days or for years. Associations with these companions may exercise greater moral influence on young persons than association with adults.

(4) The *public sentiment* of school and class, which may be regarded as an emanation from companions, is to some extent under the control of the wise teacher. He should not only know what it is, and make use of it in governing the school, but he should mould it into a finer and nobler form. The general moral tone of a neighborhood, a school, or a society should also be one of the most important considerations in placing a youth, for nothing more surely determines his future character.

II. RELIGIOUS INSTINCTS

PREPARATORY STAGE OF RELIGIOUS DEVELOPMENT

The credulity and trustfulness of children, and their dramatic and symbolic tendencies during the period of childhood, make it possible to impart to them the *forms* of any religion. Any kind of religious instruction, especially that which involves observing and taking part in religious ceremonies during childhood, leaves a permanent impression upon the mind and heart. The theological beliefs taught may later be utterly rejected by the intellect, as are fairy and ghost stories; but the forms, phrases, and ceremonies still stir the heart.

It is perfectly evident that there can be no *comprehension* of abstract theology during this period, though some sort of crude doctrine or cosmology is needed to satisfy the child's questions regarding causes and reasons. That the deeper religious *feelings* cannot be aroused during childhood is less evident, but scarcely less certain. The child has great capacity for fear and faith, which are important elements in reverence and worship. He also has a strong tendency to love whatever brings him pleasure. What he lacks is the vital element of religion in its higher form, the impulse to self-surrender—the spirit that says, “Do with me as thou wilt.” Every instinct of the child says, “Do for me as I wish, and I will love and serve thee.” This sentiment, however, is not greatly different from much of that shown forth in the Old Testament, though it is from the *deeper* sentiment of the Old and New Testament, and of the sacred books of other great religions.

RELIGIOUS TRAINING IN CHILDHOOD

The training should not be predominantly intellectual, for the child is incapable of forming abstract religious conceptions, and the ideas that he does form are almost sure to change later. An element of mystery in forms and ceremonies also makes them far more fascinating and impressive to the child than any acts which he thinks he understands. In general, therefore, training during this period should be of the heart rather than of the head, and perhaps even more of the hand, *i.e.* a training in doing, or, in other words, taking part in religious forms.

The training must vary according to the kind of religion for which the child is being prepared. As a preparation for all kinds of religion, however, the moral training previously described and the cultivation of the spirit of reverence are distinctly helpful.

The religious training of Catholics is a most admirable preparation for that religion which is based on authority. The large number of symbols and the ceremonies suggesting unexplained mysteries, in which the children take some part at stated times, are woven into their life in a way that makes them an indestructible part of it. They are thus prepared for accepting whatever is taught by the embodiment of all this mystery—the church and its priests, who are beings apart from other men.

The religious training of Protestantism is often far less effective, because it seeks to be more intellectual and to teach absolute truths instead of symbols of unexplainable mysteries. It appeals far less to the

symbolic and dramatic tendencies of childhood, which are then strongest. Authority of person or book is the basis of teaching, because most of what is taught cannot be brought within the child's experience. Since, however, religion is usually taught as a personal matter, reason is continually appealed to. The child is almost compelled to think and feel, if taught that not the things he does, but his mental states when doing them, are the important factors in religion. In thus ignoring the strongest instincts of childhood (symbolic and dramatic tendencies), and in enforcing authority while appealing to reason and in trying to make the child subjective instead of objective, Protestantism has a difficult task, and it is a wonder that it succeeds as well as it does. The changes needed to make Protestant religious instruction more effective during this period are, on the negative side, to cease trying to give children much theological instruction at this time or to make them consciously and subjectively religious, and on the positive side, to give more opportunity for children to take part in whatever religious forms and ceremonies are practised, to inculcate reverence for sacred things, and to develop moral habits.

For this period, the cruder and more objective religion of the Old Testament, and some of the narratives of the New Testament, are far more suitable than the finer and more subjective teaching of Christ and his apostles and of the psalms. Few stories in all literature can be compared with those of the Old Testament as instruments of moral and religious instruction, and their moral value is not lost even though later they come to be regarded as legends or myths.

Without entering into details, the great thing in religious training before twelve years of age is not to make children religious in the fullest sense of the word, but to prepare them for becoming religious by cultivating feelings and habits that will be in accordance with the religious impulse when it is felt. In doing this, religious conceptions should be left in a crude, plastic form, that they may be moulded to fit the broader life of the individual, instead of having to be torn out of the mind and replaced by others, to which early feelings and habits do not so readily attach themselves.

THE PERIOD OF RELIGIOUS AWAKENING

During the adolescent period, when the dawning parental instincts impel the youth to act not merely for self, but as a part of the world and for the good of the world, he is driven to consider not merely laws, people, and institutions, but also the Power and Intelligence that lies back of it all. At this stage, when idealistic imitation is so strong, and impulses of self-sacrifice are stirring the nature of the youth, the Supreme Ideal of power, wisdom, and goodness can scarcely fail to attract him and arouse aspiration and devotion. The vital breath has come, and this is the time of all others for the development of genuine religion; hence it is not strange that this is the period during which by far the larger number of people become consciously religious. Space does not permit a full treatment of this topic, hence it must be omitted, or studied in the references cited below.

Exercises for Students

1. Give illustrations of difference among various nations and among different children, as to ideas of right and wrong.

2. Should children be allowed to do a great deal of lunching between meals? Why? Mention several habits not usually considered moral, that may be a basis for moral action.

3. Illustrate how children may be taught that it pays to do right.

4. Is there any moral value in having a child wait until others have been served at the table? Why? Illustrate further how the power to inhibit impulses may be developed.

5. Have hard work and difficult games a moral value? Why? Give specific illustrations.

6. Do children's savings banks have any moral effects? Why?

7. Is there a good psychological basis for the custom of having dessert at the close instead of at the beginning of the meal? A teacher said, "I will read you a good story, then I shall expect you to study very hard the rest of the afternoon." Was she wise? Why?

8. A little girl ate very slowly because she did not wish a visitor to think her greedy. What instinct was uppermost in that case? Give other examples of the conflict of instinctive impulses.

9. Mention some cases in which you think it best to get right habits of action even by means of low motives, and other cases in which higher instincts may be aroused.

10. Indicate whether the following acts were elevating or degrading morally. (a) Mrs. Burnett, when a little girl, would not say a certain name was pretty, though she thought the lady asking her would be very much hurt if she did not. (b) A boy took from a dish the largest and reddest apple before passing it to a visitor. (c) A little girl who carefully covered a younger sister who had fallen asleep was, upon the return of her parents, given ten cents by her father. The next time her parents went away she got her little sister to lie down and be covered, hoping to get another ten cents. (d) People who have been very hospitable, frequently after their neighborhood has become a summer resort, show kindness to strangers for pay only.

Children who are working well in school are sometimes offered a

valuable prize for the best work. Is the effect the same when the prize is money as when it is opportunity for further study?

What is the effect of offering a half holiday for good attendance? What of offering a treat such as candy?

Sometimes a child is induced to tell of the misdemeanors of others by threats of punishment or offers of reward, and in other cases the attempt is made to get a child to tell by showing him that the good of the school makes it necessary. What is the moral effect in the two cases?

Bring up for discussion other cases of substituting or mixing of motives, and the moral effects of the same.

11. Illustrate the fact that ideals, only, cannot usually be depended upon to govern the actions of young children.

12. Give instances in which natural results are best for children, and others in which authoritative punishment or reward is best.

Give illustrations of temporary authority leading to self-control and of too long continued authority leading to arrest of development.

13. Report from your own experience or observation changes in feeling and attitude toward moral questions early in the teens.

14. Describe the results of experiments in self-government of which you have known, also the effects of having to bear responsibility of any kind either at home or in school.

15. Recall as many as you can of the moral ideals that you formed from the people around you or from reading.

16. Give illustrations from experience or observation of the moral influence of companions upon a child.

17. Indicate some of the ways in which sentiments of honor, truthfulness, and kindness, or other sentiments, may be developed in a school.

Suggestions for Reading

On moral and religious instincts and their prominence at puberty, see Marshall, chaps. ix, x, and xiv; Chadbourne, chaps. xi and xii; Ribot, pp. 289-377; Leuba, *Am. Jr. Psych.*, Vol. VII, pp. 309-385; Coe, *Trans. Ill. Ch. S. Soc.*, Vol. III, pp. 97-108; also "The Spiritual Life," Gale, *Jr. Ch. and Ad.*, September, 1900, pp. 17-25; *Jr. Ch. and Ad.*, January, 1902; Starbuck, *Psychology*

of Religion, or *Am. Jr. Psych.*, Vol. VIII, pp. 268-314; James, *Varieties of Religious Experiences*; Dawson, *Am. Jr. Psych.*, Vol. VII, pp. 151-178, Vol. XI, pp. 181-224; Stanley, *Psych. Rev.*, Vol. V, pp. 254-278.

On early moral and religious development and training, see Compayre, Vol. II, chaps. v and vi; Harrison, chaps. iv, vi, vii, and viii; Wiggan, pp. 141-165; Sully, chaps. vii and viii; Chrisman, *Ch. S. Mo.*, Vol. III, pp. 516-528; Van Liew, *N. E. A.*, 1899, pp. 551-559; also Malleson, Winterburn, and Proudfoot.

For investigations of children's moral and religious ideas, see Barnes, *Studies in Ed.*, Vol. I, pp. 270-271, 299-300, 332-337, 344-351, 366-367, Vol. II, pp. 62-70, 203-217, 283-307, 308-313, 323-337; Schallenberg, *Ped. Sem.*, Vol. III, pp. 87-96; A. G. Spencer, *Century Mag.*, Vol. XIX, p. 238; Barnes, *Ed.*, Vol. XVIII, pp. 387-395, Vol. XIX, pp. 72-75; Osborn, *Ed. Rev.*, Vol. VIII, pp. 143-146; Sears, *Ped. Sem.*, Vol. VI, pp. 159-187; Street, *Ped. Sem.*, Vol. V, pp. 5-40; Brockman, *Ped. Sem.*, Vol. IX, pp. 255-273; Swift, *Ped. Sem.*, Vol. VIII, pp. 65-91; Sudborough, *N. W. Mo.*, Vol. VIII, pp. 327-333; Hall, *Am. Jr. Psych.*, Vol. III, pp. 59-70; Kline, *Ped. Sem.*, Vol. X, pp. 239-266.

On moral and religious training, see Adler, *Moral Instruction of Children*; Forbush, *The Boy Problem*; Koons, *The Child's Religious Life*; Hall, *Am. Jr. Psych.*, Vol. III, pp. 59-70; *Ped. Sem.*, Vol. II, pp. 72-89, Vol. VIII, pp. 439-469; Luckey, *N. E. A.*, 1899, pp. 127-136; De Garmo, *N. E. A.*, 1894, pp. 165-173; Dinsmore, *N. W. Mo.*, Vol. X, pp. 74-80; Spencer, *Moral Education*; White, *School Management*, chapter on "Punishments"; Wolfe, *N. W. Mo.*, Vol. VIII, pp. 431-435; Hinsdale, *Studies in Education*, Chap. ii.

See also Morrison, *Juvenile Offenders*; Royce, "The Social Basis of Conscience," *N. E. A.*, 1898, pp. 196-204.

CHAPTER XII

DEVELOPMENT OF INSTINCTS — VARIOUS RESULTANT INSTINCTS AND FEELINGS

THE COLLECTING INSTINCT

THIS instinct is clearly manifested in both animals and men. When food and materials for nests and homes are collected and used or stored for future use, the act is of advantage to the individual, and often to the species, as a means of preserving the young. When, however, objects of all kinds are collected and hidden or stored and played with, as is the case with many kinds of animals, there appears to be nothing of immediate value gained by the act. It seems as if the usefulness of certain acts of collecting has led to an unspecialized tendency to collect objects of all kinds.

In human beings the instinct is very strong, and as a result not only have we museums of all kinds, but nearly every individual has at least one collection of some sort.

This instinct unites with other instincts in a way that makes it impossible to determine its actual strength. The amassing of wealth, which is an indirect way of collecting food and shelter for self and descendants, is probably often due as much to the blind impulse to busy one's self in collecting, as to the desire for money and what it will buy. The instinct is often associated with the play instinct, since the objects collected are

frequently an important source of amusement. Curiosity not infrequently contributes to the impulse, as does also the tendency to construct. The æsthetic tendencies are also often gratified in the objects collected and their arrangement.

In children the instinct is manifested to some extent in the second year, especially in connection with play; sticks, stones, etc., being collected and kept as play-things. It continues all through life, and varies not so much in intensity at different ages as in the objects with which it is concerned and the conscious motives with which it is associated. In children, especially when there is no conscious motive for the act, the impulse is extremely variable. Objects of a certain kind may be collected and guarded with the greatest eagerness, as if life depended upon their possession, then in a few days, or perhaps a few hours, they may be abandoned, thrown away, or destroyed. The sight of some one else appropriating objects, or anything that suggests the idea of securing possession of objects, is sufficient to awaken the collecting impulse, while the awakening of another interest changes the form of the impulse or causes its disappearance for the time being; yet entirely useless collections of glass, stones, etc., are sometimes preserved for years.

When the instinct is associated with some other instinct, such as the individualistic, the competitive, the imitative, the æsthetic, or that of curiosity, the impulse manifested in a certain line in childhood may continue for months or years, or even all through life. Thus a passion for collecting may develop into love of money or even miserliness, or into love of winning in any kind

of contest, or into the pursuit of an artistic or a scientific career.

The elements that make collections, or objects in a collection, desirable are, according to the reminiscences of Barnes's pupils, variety, quantity, rarity, beauty, and personal association or ownership. The reasons given for making collections are emulation, imitation, pleasure of ownership, and of classifying or arranging.

The instinct has already been utilized to some extent in school, but there are undoubtedly much more extensive and fitting uses yet to be made of it. The educational value is not so much in what is collected as in the physical, mental, and volitional activity called forth directly or indirectly while collecting.

THE CONSTRUCTIVE INSTINCT

The general tendency to construct things is largely the outgrowth of that form of the parental instinct which causes suitable places to be prepared for the shelter and protection of the young. Some constructions, however, are means of promoting individual ends, such as obtaining food or shelter for self, *e.g.* webs by spiders, holes by ground-hogs. In animals the tendency does not seem to be generalized, but is manifested only in constructions that are characteristic of and useful to the species. In man, however, there seems to be an impulse to construct, independently of any end to be gained.

From the time the child begins to pile up sand or blocks, through the ages when boys construct tools and dig caves, and men design temples, bridges, business blocks, and balloons, the constructive instinct is prominent. There is a peculiar pleasure accompanying these

acts of construction, perhaps because one feels and perceives in concrete form the evidence of his power to do, to modify and change.

The destructive tendency is probably only a modified form of the constructive, for it gives the same evidence of power to change. The destruction or displacement of something is also often merely a preliminary to the construction of something else of the parts or fragments that are being made. Children frequently break or take apart complex toys and make some crude thing in which they take great pleasure.

The constructive instinct naturally associates itself with the adaptive instincts of imitation, play, and curiosity, with the æsthetic and expressive instincts, and sometimes with various other instincts and motives.

Imitation and suggestion are the natural stimuli to this impulse. Like other forms of play, it needs to be spontaneous and free. Definite directions as to what shall be constructed, and how it shall be done, often effectively inhibit the constructive impulse.

The order of development of the impulse is from the more concrete and tangible to the more immaterial and symbolic. Making things, therefore, naturally precedes making pictures of them or compositions about them. In general, the manual element is naturally most prominent in early constructions, and the artistic and literary, in later. At present, children are often guided and drilled in artistic and literary creation before they care much about that phase of construction, and are not given sufficient opportunity for manual work till many of them have partially or wholly lost their interest in making things.

THE ÆSTHETIC INSTINCT

The biological value of this instinct is not easily discerned. It is most satisfactorily explained as a resultant tendency rather than as a primarily useful instinct. The idea that insects select flowers that are beautiful for fertilization, and hence such flowers survive, and that females select the mates most beautiful in appearance and action, and thus promote the development of the beautiful, leads to the rather absurd conclusion that all the beauty of organic life is the result of the good taste of the lower animals. The more reasonable view is, that the qualities of plants or animals that attract insects and mates, or favor avoidance of enemies, are preserved by natural selection. In other words, the useful survives. It becomes agreeable according to the general law of accommodation by which every organ of every animal comes to respond in the most favorable way to every impression that is often repeated. Leaves and grass are green because the elements favoring plant growth give them that color, and green is pleasant and restful to the eye because in the course of ages the eye has become accommodated to green. For a similar reason we find grace and beauty in nearly all forms of life and action.

Although the æsthetic reaction is in a large measure playful (the product of the excess of life above what is necessary to its maintenance), yet it is always closely associated with the useful from which it has evolved. Anything suggesting want of equilibrium or strength fails to appear beautiful because such objects have not been useful, and hence not numerous and permanent

enough to result in favorable accommodation to them. Symmetry and a position in accordance with the law of gravity are therefore universal elements of beauty. For similar reasons harmony of parts and unity of the whole is a universal requisite of beautiful objects. The elements of beauty that are associated with universal laws of existence and permanency are therefore responded to in approximately the same way by all nations of people.

Those that are associated with local characteristics and customs, on the other hand, are responded to differently by each nation, tribe, and community. For example, the peculiar blues of Scandinavian art are not so much enjoyed by people of other countries where they are rarely found in nature. Our music, also, is as painful to the Chinese as is theirs to us.

Recent experiences make wonderful changes in the æsthetic reaction. Even in the same community the beautiful sleeves or hats of last year are "horrid" a year or two later. What is common for temporary reasons, as well as what is common because constantly useful, comes to be regarded as beautiful; hence beauty is in part a matter of style or custom.

Since the experience of each individual differs from that of every other, each person has also, in a measure, his own standards of beauty. Purely personal associations aroused by an object sometimes have more influence upon one's judgment than the more universal and fundamental elements of beauty.

Standards of beauty are therefore partially determined by universal laws of use and beauty, partially by local surroundings, customs, and style, and partially by indi-

vidual peculiarities of temperament, experience, and training.

The æsthetic instinct is closely connected with several other instincts. Whenever certain forms of the play impulse are clearly marked, either in animals or children, there is good reason for believing that there is a crude form of æsthetic appreciation. This is especially true of all playful exhibitions by animals, of form, color, movement, and voice, by which they and their companions, especially mates, are pleased. Such acts of showing off and of adornment are common among all savage tribes and are very characteristic of children.

The æsthetic impulse is thus a form of the play instinct and closely associated with the parental and social instincts. It is not less closely associated with the rhythmic, dramatic, constructive, and expressive instincts. The joy of doing always culminates in the pleasure of contemplating the beauty of the product or the performance. The impulse to express mental states also reaches its climax when the expression itself is beautiful.

The development of the æsthetic impulse is greatly influenced by the development of the instincts with which it is associated. It cannot, therefore, reach its deepest and broadest development until after puberty. In early childhood the æsthetic sense is largely sensory; color, sound, and rhythm being the most effective stimuli. Beauty of form, harmony, and unity become more important as the mind develops and standards are formed by habit and training. Colored pictures and those with subjects interesting to young children therefore appeal more to them than the most artistic black and white pictures.

Vocal skill and auditory appreciation develop much earlier than manual skill and visual appreciation (except in the case of colors). Children enjoy rhythm, melody, and the act of singing much sooner than they appreciate symmetry of form, unity of design, and the power to make beautiful forms. Lancaster's investigations show that, on the average, great musicians achieved their first success at nine or ten years of age; while artists have not obtained corresponding success until about eighteen years of age.

That the æsthetic instinct should be developed is admitted by all, but there is difference of opinion as to the best method. Should only the highest art be shown children, even though they do not appreciate it, or should they be allowed to revel in bright colors and sharp contrasts until their æsthetic appreciation becomes less crude? It is of no use to place before them high art that excites no interest or feeling, and, on the other hand, continued association with crude and imperfect art develops wrong standards. Nature gives the best models because universal laws of beauty are shown in every flower, leaf, and twig. Other models for children should be chosen: first, because they exemplify fundamental laws of beauty; and, second, because they have qualities that will attract the attention and arouse the interest of children. Great works of art that appeal to children because of their color, or the subject represented, will mould their taste; while those that fail to attract their attention will have little or no influence. Care should therefore be taken that pictures in the schoolroom are both artistic and interesting.

THE MIGRATORY INSTINCT

In its primitive form this instinct is probably nothing more than a manifestation of the general tendency to act so as to increase or get more of a favorable stimulus already received. At a certain season of the year, salmon, for example, experience bodily changes preparatory to the production of young, that cause them to move so as to get into an environment more and more favorable to their present bodily state as regards temperature, chemical condition, etc. The result is that after many days they find themselves in the fresh water where their eggs were deposited the year before. After the breeding season, movement in the opposite direction is more favorable, and the ocean again becomes their home.

This is the fundamental form of the instinct which makes every animal, including man, experience an impulse to migrate when, through changes in himself or his surroundings, he is out of harmony with his environment. The impulse is felt in the spring by nearly every one in a greater or less degree. Some persons, such as tramps, pioneers, and travellers, never become so firmly settled and accommodated to any environment that they do not yield to the migratory impulse.

Children of two or three years nearly always have a period of running away. Later, the impulse to play truant from school or to leave home often comes, and is frequently acted upon without conscious purpose or reason. The impulse is especially strong during the period of adolescent changes, and if there is not actual running away there is at least a strong desire to travel.

Special causes of discontent often bring on or increase such impulses.

THE RHYTHMIC INSTINCT

The universal tendency to rhythm in action may be considered under the head of instinctive tendencies, though it is really an organic and automatic tendency even more fundamental than an instinct.

Rhythm is a marked feature in physical phenomena as well as in plant and animal life. In man, all bodily processes are rhythmic, and all repeated movement tends to take a rhythmic form. It is not surprising, therefore, that consciousness is rhythmic. There are rhythms of attention, activity is followed by rest, and one emotional extreme is succeeded by its opposite. Consciousness even makes rhythmic what is objectively without rhythm, as when continuous and uniform beats of a metronome are heard as rhythmic beats.

The more instinctive form of the rhythmic tendency is shown in the impulse to produce rhythmic movements and sounds, and to appreciate or respond in a particular way when such rhythms are produced by others. Both of these tendencies are manifested in the first few months of life. The tendency remains much the same all through life except that the rhythms become more complex. The rhythm of conversation, music, and poetry is often appreciated long before the other elements of which they are composed. Mother Goose rhymes and some of Tennyson's finest poems are enjoyed by children for exactly the same reason, *i.e.* their rhythmic character. Many games also

owe their charm to the opportunity they afford for rhythmic sounds and movements.

RELATION OF INSTINCTIVE ACTIONS TO FEELINGS

In general, an instinct, as Professor James says, is a tendency to act; and an emotion, a tendency to feel. Since most instinctive actions are at least occasionally accompanied by feeling, there is an emotion for every instinct. Every emotion has also its appropriate bodily expression which varies somewhat from the corresponding instinctive action.

The tense muscles, labored breathing, pale or flushed face, quickened heart beat, and irregular movements of *anger* are only partially reproduced in the purely instinctive movements of fighting. The act of fighting is exhilarating and pleasurable, while anger, especially when it takes the form of irritation and hate, is rather painful and depressing. Anger appears whenever an action of any kind is interfered with, as is clearly shown in young babies. The resulting irregular, varied, and vigorous movements often overcome the interference, and fighting movements are probably the result of the selection of the most favorable of these. When the stimulus to action continues without the obstruction being removed, irritation or sullenness and smouldering hate of the cause of the interference are likely to result.

Jealousy and envy are produced by the sight of another enjoying the pleasures of a loved being or object. These emotions seem to be experienced by nearly all species of animals and are usually especially promi-

nent in children. The tendency to them remains strong all through life, but is suppressed and covered up by training and social convention.

Humorous emotions are, in nature and cause, the opposite of those of anger. Instead of interference with activity, when the sense of humor is aroused there is a sudden opening of a channel of free activity. Any sudden stimulus giving rise to playful movements is likely to arouse the emotion in young children and perhaps in animals. The delight of children in "peek-a-boo," and in all play in which there is a sudden transformation that may be accompanied by movements of laughing, jerking heads away, running, etc., indicates the early rise of this emotion. When a child of less than two suddenly turns his head away from the one he has offered to kiss, and runs off laughing, the presence of humor is unmistakable. In general, humor is the result of a more or less serious form of physical or mental reaction being suddenly converted into a playful form. Naturally, therefore, humor and pathos are often associated, and "there is only a step from laughter to tears." Humor is a permanent emotion, as play is a permanent instinct, but it is stronger in childhood than in old age. The stimuli to humor, like the forms of playful activity, vary greatly with age. The child's humor is often nonsense to the adult, and the adult's, incomprehensible to the child; but whenever they can play together they meet on a common basis.

The emotions of *awe* and *reverence* are accompaniments of reactions which involve little or no movement because there is no movement suited to the stimulus which arouses them. The object arousing the emotion

is impressive but not exciting, and there is no fitting motor response except the more or less complete inhibition of movement. It is related to that form of the fear instinct in which safety is gained by keeping still; but the object is less definitely fearful, and is attractive rather than repulsive.

RELATION OF FUNDAMENTAL STIMULI TO FEELINGS

There are many kinds of stimuli that have affected the development of mind in animals and men from the earliest ages. Heat and cold, fire and frost, light and darkness, the clouds and heavenly bodies, water and earth, trees and flowers, birds and animals, heights and depths, open and closed spaces, feathers and fur, eyes and teeth, etc., are some of the more or less constant stimuli that mould mind in the race and the individual. A large amount of data regarding the feelings and ideas excited by these phenomena of nature has been collected from folklore, reminiscences of adults, and observation of children, under the direction of Dr. Hall. This material is very interesting and suggestive, but exceedingly diverse. This is probably to be expected, since the favorable or unfavorable character of these phenomena varies with the species concerned and with various conditions, surroundings, and experiences of the species and the individual. Thus water or fire may be fascinating to one, terrifying to another, and tranquilizing to a third, or each of these to the same individual, when appearing in special forms.

It is evident also from the descriptions, and from well-known laws of association, that many of the emotions excited by these stimuli are the result of early experi-

ences of the individual with such stimuli, or of the influence of the words and actions of adults in connection with them. It is utterly impossible from the studies thus far made to say how far these mental states or "psychoses" are due to hereditary racial experiences and how far to individual experiences in connection with social heredity.

The nature and development of the emotional life of man can never be understood till we have learned more regarding the universal effects of instinctive actions, and of the more constant and universal stimuli, upon mental activity and feeling. Many years must elapse before such knowledge can be obtained.

Exercises for Students

1. Report full details of one or more collections that you have made. Give some specific illustrations of the way in which the collecting instinct may be utilized in education. Are ready-made collections of as much value as pupil-made collections? Is it of any advantage to children to make scrap-books?

2. A boy of four worked a considerable part of two days constructing a tool box out of laths, and a very restless little girl worked steadily for two hours sewing on a dress for her doll. What does this indicate? Give a number of illustrations of ways in which the constructive instinct may be utilized in the different grades in the school.

3. Report instances where children have been greatly affected by what they regarded as very beautiful or ugly. Mention various ways in which the æsthetic impulse may be cultivated directly and indirectly in school.

4. Give illustrations from your own experience or observation of the strength of the migratory instinct. May mental changes be made to take the place of physical ones, *e.g.* imaginary journeys for real ones? Illustrate.

5. Give illustrations showing the strength of the rhythmic tendency, and show how it may be utilized in school.

6. Give illustrations of the instinctive basis of various emotions.
7. Reminiscences and observations regarding the influence of light and darkness, and perhaps of other stimuli, should be reported.

Suggestions for Reading

- On children's collections, read Barnes, *Studies*, Vol. I, pp. 144-146; C. Frear Burk, *Ped. Sem.*, Vol. VII, pp. 179-207; Grossmann, *Jr. Ch. and Ad.*, April, 1901, pp. 377-385.
- On the constructive instinct, see Small, *Am. Jr. Psych.*, Vol. XI, pp. 152-153; and on its use in education, see Dewey, *The School and Society*.
- On æsthetic feelings, see Ribot, pp. 328-367; Scott, "Sex and Art," *Am. Jr. Psych.*, Vol. VII, pp. 153-226; Harris, *N. E. A.*, 1897, pp. 330-338; Chamberlain, pp. 173-189; Sully, chap. ix; Brown, "Art in Education," *N. E. A.*, 1899, pp. 112-121.
- On migratory impulses, see Kline, *Ped. Sem.*, Vol. V, pp. 381-420; *Am. Jr. Psych.*, Vol. X, pp. 1-81; Dinsmore, *N. W. Mo.*, Vol. IX, pp. 183-186; Brooks, *Pop. Sci. Mo.*, Vol. LII, pp. 784-798.
- On rhythm, see Bolton, *Am. Jr. Psych.*, Vol. VI, pp. 145-238; Sears, *Ped. Sem.*, Vol. VIII, pp. 3-34; *Am. Jr. Psych.*, Vol. XIII, pp. 28-61.
- On various impulses and feelings, see Burk, "Teasing and Bullying," *Ped. Sem.*, Vol. IV, pp. 336-371; Bolton, "Hydro-Psychoses," *Am. Jr. Psych.*, Vol. X, pp. 169-227; Hall, "Tickling and Laughing," *Am. Jr. Psych.*, Vol. IX, pp. 1-41; Hall and Smith, "Reactions to Light and Darkness," *Am. Jr. Psych.*, Vol. XIV, pp. 21-83; Hall and Brown, "Fire, Heat, Frost, and Cold," *Ped. Sem.*, Vol. X, pp. 27-85; Hall and Wallin, "How Children and Youth Think about Clouds," *Ped. Sem.*, Vol. IX, pp. 460-506; Ellis, "Fetichism in Children," *Ped. Sem.*, Vol. IX, pp. 205-220; France, "Gambling Impulse," *Am. Jr. Psych.*, Vol. XIII, pp. 364-407; Chamberlain, *The Child as Revealing the Past*, chap. vii; Small, "Methods of Manifesting the Instinct for Certainty," *Ped. Sem.*, Vol. V, pp. 313-380; Phillips, "The Teaching Instinct," *Ped. Sem.*, Vol. VI, pp. 188-245; Arnett, "Origin and Development of Home and Love of Home," *Ped. Sem.*, Vol. IX, pp. 324-365; Lindley and Partridge, "Some Mental Automataisms," *Ped. Sem.*, Vol. V, pp. 41-60.



CHAPTER XIII

DEVELOPMENT OF INSTINCTS—THE EXPRESSIVE INSTINCT

ORIGIN, NATURE, AND FORMS

THIS instinct belongs with the resultant and miscellaneous group because it owes its origin to various other instincts. Expression is a means of frightening enemies, and communicating with friends regarding food and danger, consequently it has been developed in the attainment of individual, parental, and social ends.

In the lowest animals, expression, so far as there is any, is accomplished by means of feelers or antennæ (notably in the case of ants), but in higher animals the chief means used are sounds. Most mammals and birds have from two or three to a dozen different calls which are appropriately responded to by others of their species. In man, the expressive instinct reaches its highest development because of his social nature and the perfectness of his vocal organs, and also because of the complexity of the mental states to be expressed. Instinctive emotional expression and expressive gestures are so effective that savages, without a word of artificial language in common, can communicate more accurately than any of the lower animals.

Man is not limited, however, to the language of natural signs. Every race has formed an artificial language

of arbitrary symbols. Animals, on the other hand, have no artificial language, and only a few of them can use such language even in an imitative way. In man, the need for such a language is so great, and the instinct of expression so strong, that children who had never heard any language would probably form a crude one suited to their needs. The fact that children who hear but little spoken language sometimes, as Horatio Hale has shown, form a language of their own, is evidence of this. Many children also invent new words, notwithstanding the fact that they continually hear a fully developed language.

Since any means by which the mental state of one being is expressed to another is a language in the broad meaning of the term, words may be tactual, motor, or visual, as well as auditory; and ideas may be expressed in the permanent form of some constructed object or representation, as well as temporarily by sound, touch, or gesture. Constructive activities of all kinds are important forms of expression; but we shall take space to discuss in detail only the forms in most general use, namely, (I) Oral Language, (II) Written Language, and (III) Drawings.

I. AUDITORY LANGUAGE

FACTORS CONCERNED IN ITS ACQUISITION

The fundamental factor is, of course, the *expressive instinct*, and this is founded on a still more fundamental organic tendency, *i.e.* the tendency to respond by movement of some kind to every stimulus received. In the purely expressive form of reaction the movements made

are not usually valuable in themselves, but because of the movements they cause others to make. In a complex being such as man, so many stimuli are received and noted that the most economical form of response is by means of a word for each different kind of stimulus, whether object as "tree," or an organic state as "hunger." Writing the word "tree" is simply a shorter and more convenient means of indicating the object than would be the act of going to one and touching it. The fundamental basis of vocal language is therefore to be found in the tendency to respond by one kind of movement and sound to each of several similar stimuli. The modes of response that will fit the largest number of cases are selected and developed into the words of an artificial language; words, therefore, take the place of many other forms of movement.

The next most important factor, in producing a vocal language, is the *imitative instinct*. This leads to sounds and gestures being responded to by similar sounds and gestures. These naturally arouse corresponding ideas in other persons, and are therefore often repeated and learned. They are then used for other similar stimuli, and thus they become words and a means of classification of objects. The use of "tree" for certain kinds of objects, "flower" for others, and "animal" for others causes the common characteristics of each class to be noted more carefully, and the general notion or concept of it is thus perfected. Other symbols are used to indicate sensations and qualities as well as objects and acts. Often they are also applied to analogous and associated objects. Not only knives are "sharp," but pains, vinegar, and wits. "Kitty" meant to M. not only the animal, but

anything that was soft to the touch, and finally anything that was pleasing.

In the case of a child surrounded by people speaking a vocal language, imitation is the most important factor in his language development. The child has continually before him examples of persons responding to stimuli by words only, and the imitative instinct leads him to respond in the same way. He is much more likely to imitate a response than an original stimulus, though sometimes the child who has not been taught the word "dog," for example, will say "bow-wow" when he perceives or pictures the animal; but with equal opportunity to hear a dog bark and hear the word "dog," he is likely to adopt the sound used by others. For this reason each child, no matter what his nationality, learns the language he hears spoken. Deaf children are usually slow in learning visual language as well as auditory; but not so much because hearing is necessary to language learning as because they are deprived for many years of the chance to imitate any artificial language.

The *play* instinct is another important factor in language learning by children, especially at first. Before learning to talk, and sometimes afterward, children frequently use their vocal organs as playthings, and thus develop their vocal centres in preparation for the production of any sound they may subsequently have occasion to use. Later, children often combine and substitute words in various ways, as a matter of amusement.

Necessity, which really means action for one's good, or conformity to the fundamental individualistic instinct, is another important factor in the individual language

development, as it was perhaps the chief one in the development of language by the race. The child who learns to understand words of warning or approval succeeds in avoiding various painful stimuli and in securing pleasant ones. Similar results come from ability to indicate hunger, and objects of fear or desire. If a child is helped to what he wants in response to the language of natural signs, he is often slow in using conventional language; hence, it is sometimes well for parents to refuse to understand the wants of children old enough to talk until they try to express them in words.

Another more obscure but very important factor in acquiring language is the instinctive *social* tendency to have sympathy and approval. This is also really a phase of the expressive instinct itself. Children seem especially desirous that others shall hear, see, and feel what they do, as well as that they themselves shall have the same experiences that others are getting. Language is one means of sharing experiences, hence it is used a great deal for that purpose. Children often repeat over and over a statement to make sure it is understood, and cease only when they receive assurance by word or act that they have been understood. Language is the chief medium by which the wider social life is brought to the individual soul, and by which he infuses his own mental states into the thoughts and feelings of the group to which he belongs. All impulses to communicate, whether to engage in the most trivial gossip or to give expression to the profoundest feelings and thoughts, are the result of the social tendency to share one's experiences with others of his kind.

STAGES OF LEARNING ORAL LANGUAGE

Instinctive Stage

The instinctive language which man has in common with the lower animals is that of emotional expression. He begins life with a cry and often ends it with a moan. This language of natural signs is not learned by the individual, but is instinctively understood and spoken by all races.

At first the child has no cry except for pain, and little or no variation in its cry to express the kinds of pain. Soon, however, the cry of anger or the wail of disappointment is differentiated from the cry of physical pain. At about the same time, or a little later, other cries, screams, gurglings, and cooings, suggestive of energy or pleasurable contentment, are made. Differentiation in vocal expression probably proceeds more rapidly than differentiation of the different forms of emotion, since emotions are probably, in part at least, the result of what is called their expression.

Children only a few months old are sensitive to emotional expression of others, and may be soothed, irritated, or depressed by appropriate tones of voice. Vocal laughter, however, is sometimes rather late in appearing in children and correspondingly late in being understood. My own little girl was well along in her second year before she laughed aloud, and until she herself laughed, was disturbed and even frightened by the sudden laughter of others.

Besides the purely instinctive language of emotional expression, there is usually developed in the second

year a more intellectual language, which prepares the way for purely symbolic language. The child learns to vary the tone of his grunts and squeals so as to express fear, surprise, question, desire, satisfaction, and assent, and he associates gesture with these variations in tone. Soon, therefore, he can express, to one quick to interpret, nearly all his feelings, ideas, and wishes. All through life, tone of voice, emphasis, inflection, and gesture continue to be effective aids in expression, and important means of interpretation, especially of whatever concerns the emotions.

Since the child's life is more emotional than intellectual, this form of language is peculiarly appropriate in communicating with him. After he begins learning artificial language, the instinctive language of tone and gesture remains an important means of communication, and an effective aid in interpreting what is heard. A child may be commended in tones that will make him cry, or condemned in accents that will cause him to smile with pleasure.

Playful and Imitative Stage

This stage of language learning does not take the place of the preceding stage, but is added to it. Beginning in the second quarter of the first year, it is usually prominent for from one to several years. In the second and third quarters of the first year, the vocal organs of a child are his most important playthings. During this period of babbling a child may make nearly every sound in the language.

In the last quarter of his first year, babbling often gives place to imitation, and instead of repeating chance

often deterred from trying to use words by inability to pronounce them correctly.

The question of pronunciation is simply one form of the general problem of how voluntary motions are acquired. Some sounds, and especially some combinations of sounds, are difficult of utterance for adults as well as for children; hence it is not easy to separate the childish difficulties from other difficulties of the language. A study of the first sound of all the words used by children will show that words beginning with certain sounds, such as *th*, *r*, are not so well represented as those beginning with other sounds, such as *t* and *b*. This may be interpreted as showing that words beginning with difficult sounds are avoided. To mean anything, however, the prominence of those sounds in adult language must be considered. A study of the sounds mispronounced, especially of those at the beginning of words, and of sounds substituted for those presumably more difficult of pronunciation, therefore, may be more significant. The difficulties, however, of getting accurate records of children's pronunciations (many of which are intermediate between sounds recognized as elementary by adults) are so great that one does not feel sure of the data. The errors and substitutions change also with age, and vary greatly with individuals. Presumably there is some law of variation with age corresponding to the natural order in which the centres controlling the vocal apparatus develop, though the course of development must be greatly modified by individual training and experience. Common observation indicates that this order is from large, comparatively free, to finer and more definitely controlled movements

involving accurate coördination of the several parts of the vocal apparatus. The fact that sounds are difficult not merely in themselves, but according to the sounds with which they are associated, makes the question of the natural order of development an exceedingly complex one.

Habit and the relation of one centre to another also modify the natural order, if there be one, to such an extent that its determination is very difficult. As soon as a new word is learned there is a tendency to assimilate other words to it; hence the pronunciation of any word is likely to be modified by some other word that has recently been learned or often pronounced. Thus Mrs. Moore's boy, who used "ama" for "grandma," used "appa" for "papa," and after learning "ba ba" for "baby," changed to "pa ba," and after using "be be" for "baby," to "pape," and then finally to "papa."

Again, pronunciation is a matter of auditory perception and memory, as well as of motor development. As a consequence, words are often mispronounced because the child does not discriminate sounds accurately, and still more often, because he discriminates sounds just as they are pronounced by adults, instead of as they should be. Most adults slur certain sounds, and the child naturally reproduces only the accentuated portion of the words he hears, or fills out the word with sounds already familiar to him. For example, a child who had been singing a familiar hymn suddenly stopped, and said, "What is a consecrated cross-eyed bear, anyway?" The first or last or most impressive syllable only of a long word is often used because it is most noticed and best remembered.

The rate at which children overcome the difficulties in the way of learning to understand and pronounce words becomes more, rather than less, marvellous as it is studied. Records of children's vocabularies, which have multiplied greatly within the last few years, show that children of two or three years actually use more words than adults were formerly supposed to use. From thirty to a hundred new words a month is not an unusual rate (of learning) after the acquisition of language fairly begins.

Children rarely learn to walk and to talk at the same time. When, as is usual, walking precedes talking, the language-learning stage is not generally marked till the last half of the second year. At two years of age a child's vocabulary may not exceed a score of words; but is likely to number from two to four hundred, and may reach the surprising figure of ten or fifteen hundred. The rate of acquiring words between two and four years of age varies with the degree of interest in learning as compared with interest in combining words already known, and with the waxing and waning of interest in other forms of motor activity, such as walking or building with blocks. The child's vocabulary may therefore increase very rapidly for a month or two; then remain almost the same for a time, while facility in the use of the new words is gained, or while interest is temporarily occupied with objects and acts, rather than their names and descriptions.

As to the kind of words most learned by children, close study shows that the supposition that nouns especially appeal to children, is wholly wrong. At two years of age the proportion of nouns in children's vocabularies

is about the same as in the language, viz. 60 per cent; but the proportion of verbs is about 20 per cent, or nearly twice what it is in the language. Adverbs are also relatively more numerous than adjectives. These facts harmonize with other studies, showing that children are more interested in actions than in things. Adjectives and verbs are often learned first, yet nouns seem to predominate during the first months of speaking, when the per cent may be 70 or 80. In reality, however, the noun idea is not so prominent as this, for words that in adult language are nouns are to the child verbs, or else the distinction is not yet made. For instance, M. used "bed" in the sense of lie down, just as we use "dress" to mean the act as well as the object. Prepositions also are at first for the child nearly always verbs, "up" or "down" signifying the act rather than the position.

Sentence-making Stage

Groups of words, *e.g.* "da 'tis" (there it is), are sometimes learned before single words; but words learned separately are rarely combined until they have been used separately for some time. The stage of word learning gradually merges into the stage of word combining, and a close observer will usually discover that a time comes when a child is more concerned with the combination of familiar words than with the learning of new words. This stage is apt to become prominent in the third or fourth year.

The single words that a child uses are, in a way, sentences, especially when expression is helped out by tone inflection and gesture, *e.g.* "papa" means "Papa

has come," "I want my papa," "That is papa," "Papa will do it," "I will give it to papa," etc.

An exact report of what a child just beginning to combine words says, is surprisingly unintelligible to one knowing nothing of the child, or, the circumstances and tone of voice accompanying the words. Only that portion of a thought that is accentuated or seems to need statement is expressed in words—all the rest is understood from the circumstances or expressed in some other way, *e.g.* "Little story" means "Tell me a little story."

Progress in sentence making is the result of three processes: (1) the substitution of words for what is understood or indicated by tone or gesture; (2) analysis of situations into separate elements which then are expressed by words; (3) increase of mental grasp so that the relation of different elements to each other is held in mind, and words selected and arranged to express that relation.

The shifting of interest and attention from the thing to the actor or the action evidently calls attention to the elements of a situation and leads to the attempt to express the various elements and their relation. Adverbs, adjectives, and prepositions are the result of attempts to express the less important phases of thought and their relations, *e.g.* "Get bed papa" becomes later "I want to get in bed with papa."

Soon more complex relations are expressed by the introduction of conjunctions and relatives so as to connect clauses into complex sentences, *e.g.* "I will go and see if papa is there."

The arrangement of words is determined largely by

imitation, but is also influenced by shifting of interest and attention. Thus, a little girl said, "Eat, papa apple," then a moment later when apple (as contrasted with pear) was most prominent in her mind, she said, "Apple, papa eat," while at another time, when the person was most thought of, she said, "Papa, eat apple."

Records of all sentences used by a child between two and four, during an hour or more, taken at regular intervals, show a marked increase in completeness, length, and complexity of sentences, as is shown by the following extract from such a record and the table on page 236.

Twenty-eighth month. "More pencil" (I want the other pencil); "Little story" (Tell me a little story); "That all?" (Is that all?); "New cuff?" (Is that a new cuff?) "Cracker want" (I want a cracker).

Thirty-fourth month. "Know where is my papa?"; "I want kiss baby"; "No want to be dressed"; "I don't want to be dressed"; "Got some little birds on" (said of a screen).

Fortieth month. "Baby want to get down run round a little while"; "I run back and forth"; "No, I don't want to run out in the hall"; "Baby do like to have me run in here, baby do"; "He want me to run here."

Forty-sixth month. "This is a nice little kitty"; "Don't you want to go down there and pat him?"; "Why don't you, he is nice and soft?"; "He is afraid sometimes"; "I tried to catch him and give him to you to pat him."

Contrary to all rules of grammar, most of the child's first sentences have no subject, many are without an assertive verb, while only a few are without an object. The length of sentence is doubled in a few

TABLE OF SENTENCES AND WORDS USED BY "M."

Date	Nov. 11, 1898		May 13, 1899		May 13, 1900	
Age	28 months		34 months		46 months	
	No.	%	No.	%	No.	%
Sentences	100	100	100	100	100	100
Compound Sentences	3	3	5	5	29	29
Complex Sentences	0	0	11	11	14	14
Compound and Complex Sentences	0	0	1	1	6	6
Clauses	101	101	117	117	156	156
Compound Subjects	0	0	0	0	0	0
Compound Predicates	0	0	1	1	3	3
Compound Objects or Modifiers	0	0	1	1	7	7
Prepositional Phrases	2 (8) ¹	2	15 ¹ (11)	15	29	29
Infinitive Phrases	2	2	17 (2)	17	26	26
Assertive Sentences	42	42	45	45	50	50
Question Sentences	20	20	14	14	28	28
Command or Wish	37	37	37	37	22	22
Incomplete Sentences	96	96	62	62	23	23
Subject Omitted	81	81	38	38	9	9
Assertive Verb Omitted	67	67	44	44	14	14
Object of Verb or Preposition	4	4	5	5	0	0
Words	235	100	405	100	700	100
Nouns	91	38.7	73	18	108	154
Pronouns	12	5.1	113	27.8	186	26.5
Verbs	53	22.5	137	33.6	217	31.0
Adverbs	20	8.5	32	7.8	94	13.4
Adjectives	46	19.5	24	5.9	49	7.0
Prepositions	9	3.8	23	5.6	27	3.8
Conjunctions	0	0	1	0.2	19	2.7
Interjections	4	1.2	0	0	5	0.7
Different Words	107	57.4	130	32.1	180	25.7
Nouns	50	46.7	44	33.8	43	3.9
Pronouns	4	3.7	15	11.5	18	10.0
Verbs	24	22.4	41	33.5	65	36.0
Adverbs	7	6.5	10	7.7	23	13.3
Adjectives	17	15.8	12	9.2	16	9.0
Prepositions	2	1.8	8	6.1	6	3.3
Conjunctions	1	.9	0	0	7	3.9
Interjections	2	0	0	0	2	1.0

¹ Additional phrases partly expressed.

months, and complex and compound sentences appear and increase in number, showing the rapid increase in mental grasp or span of consciousness.

In changing words to indicate person and number, and in arranging words in the right order, children often make mistakes, but the irregularity of the language in forming plural or tense forms is usually the cause. Without conscious generalization, children are marvelously quick in applying a common form of ending or law of language to new words, *e.g.* "tooken," "eated," "mans." A similar influence often leads children to make new forms of words according to the genius of the language. Thus M., who had been rolling a hoop, said she had been "hooping," and at another time spoke of her shoe as "worning" out.

II. VISUAL LANGUAGE

The factors leading to the understanding and use of visual language are only partially the same as for oral language. Visual language, as we have it, is at best purely conventional, and hence it is not directly based on or associated with a natural and instinctive form of expression, as is oral language. The imitative tendency is appealed to less frequently and less impressively by visual than by oral symbols. Necessity, or the gaining of desirable ends by understanding and using visual language, is a much less important factor in learning to read and write than in learning to talk, because the child already has an adequate and easier means of communication in his oral language than he had in the language of natural signs when learning the oral. It is also much more difficult to make the understanding and

use of visual language as necessary to the gratification of the daily desires of the child than in the case of oral language. Questions, answers, commands, and remarks might, however, be expressed in visual language a great deal more than they are in the primary schools.

In the early stage of learning to read and write, the only instincts that can be appealed to with as great effectiveness as in oral language are the play instinct and the social desire for approbation. Hence, although much pedagogical skill is now expended in arranging words so as to show their likeness and difference, and lead to their analysis and classification, the progress in learning visual language is, for some time, slower than in the early stage of oral language learning without any formal teaching whatever. Children would probably progress much faster if oral language were associated with visual, in much the same way that oral language is at first supplemented by the instinctive language of natural signs. For example, a teacher may write only the most important words of a sentence and speak the others, or in the earlier attempts at writing children may be allowed to speak some of the difficult words in every sentence that they write.

After children have gained the power to read with some facility, the instinct of curiosity and the desire to know about the world and its people, and to share the thoughts of mankind as expressed in books, are the important factors in language learning. A sort of reading craze often sets in at this time, which results in an enormous addition to the youth's vocabulary (probably a thousand words a year would be a low estimate, since, according to my investigations, high school graduates

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usually know the meaning of twenty or thirty thousand words). The reading also exercises a great influence on the language habits. Sometimes even oral language is thus rendered "bookish."

The impulse to express to individuals or to humanity his own ideas and feelings in poem, story, article, or book, often becomes strong in the early teens. If teachers could skilfully use this impulse instead of ignoring or checking it, enormous advances would be made in teaching language as a means of expression.

Interest in language as such, aside from ideas to be expressed, is often first manifested in a marked degree (not counting the early period of imitative play) in a playful form of learning to use and construct secret languages. This tendency reaches its climax at about thirteen. Probably, therefore, this is the age for learning foreign languages. Interest in the study of language as a form of art or as a science, such as is required in literary appreciation and the study of grammar, cannot be greatly developed until the language is learned, and as a rule only after some of the higher forms of æsthetic appreciation and of abstract thought of the early teens have been reached. Up to this time, children are interested in language only as a means of expressing thought, and the correctness of their language is almost wholly the result of imitation and habit.

After language is learned, rather than before, is the time for studying its structure and appreciating its beauty. Grammar is not to be regarded as a means of speaking correctly, but as a scientific analysis and classification of means of expression that are already familiar. In this, as in other cases, the natural order for the race

and for the individual is to learn how to do a thing, then to admire grace in doing it, or enjoy the scientific study of how it is done.

III. DRAWING

Drawing may be considered as an art based on the constructive and æsthetic instincts, but in its earlier stages, at any rate, it is to a considerable extent really a language based on the expressive instinct.

There is no purely instinctive stage of drawing as there is of oral language, but there is a very well-marked playful and imitative stage. Children delight in making marks just as they delight in making sounds, so the scribble stage corresponds exactly to the "da da" stage of oral language. The sight of some one using a pencil is likely to set a child to scribbling, just as the talk of others often sets the young child to babbling. In neither case is there at first any real imitation of distinct movements. A little later crude attempts at imitating the movements of others are made, but with much less persistency and success than in the case of sounds. Evidently the natural relation of eye perceptions to hand movements is much less perfect than between ear perceptions and vocal movements.

In the next stage, corresponding to the word-learning stage of oral language, drawings are made by the child not merely for the pleasure of making movements and the joy of imitating, but in order to express ideas of objects and events. Any dot or line or combination of them that suggests to the child the appearance of any object is at first a perfectly satisfactory picture of it. Often a "picture" is named or renamed after it

is made, because something is suggested by the lines or dots. What to the child is most essential, whether visible or not, is indicated, and the rest unnoticed or filled out in the mind. The stomach of a man may be represented when neither the rest of the trunk nor the arms are shown. At first the different parts of a man may be scattered over the paper, a dot or curve being pointed out or made as each part — eye, mouth, head, etc. — is named.

A little later much more attention is paid to the position of one part in relation to the others, and still later, to the relative size of parts. This evidently corresponds to the word-combining or sentence-making stage of language expression. The child not only tries to make something that will suggest the idea he wishes to express, but aims to represent objects; just as in language, his sentences become not merely suggestive of ideas, but complete expressions of them.

At the time when the child's drawings are partly symbolic and partly representative, they are often very free and unconstrained expressions of his ideas. His make-believe tendency helps him to see in his drawings all that he meant by them. He has little feeling of their inadequacy, and is ready to make almost anything, and to tell almost any story with his graphic art by which both outside and inside of houses are shown, wind or heat indicated, successive events pictured, and the important parts shown by increased size. During this period the child draws from what is in his mind rather than from what he perceives, hence his picture of a man or table is generic rather than individual, as is shown by the fact that placing a model before him produces little

or no modification of the conventional design he has adopted.

Sooner or later, perhaps most frequently at about nine years of age, the child begins to feel the inadequacy of his representations. He can no longer believe that his drawings really look like what he wishes to represent ; hence he is not so ready to try to draw everything. This is the time when he needs encouragement, and before long some instruction as to how he may show perspective and represent objects as they look instead of as they are. The difficulties of doing this are so great, especially when the process is not associated with the desire to express something, that only a few ever regain their former freedom of graphic expression. Drawing becomes for most children, therefore, an exercise in mechanical imitation and representation instead of a favorite means of expression. If drawing were taught in these early stages as a mode of telling what has been observed, rather than as an art, the results would be far better.

A little earlier than the time at which language acquires a scientific and æsthetic interest, drawing acquires similar interest, and great delight may be taken either in mechanical drawings or in the making of beautiful drawings or pictures. All along there has been some æsthetic interest in colors, but now this interest is deepened and refined, and the appreciation of beauty of form develops. This is the time for artistic and mechanical drawing and for the study of the subject as a science or as a fine art, though drawing as a convenient means of expressing ideas gained in nearly all subjects studied should not be neglected.

Exercises for Students

1. Describe means of expression employed by animals, and show that they are useful.
2. Describe any modes of expression that you have noticed infants use.
3. What kind of words do the blind learn? The deaf? Those who are both blind and deaf?
4. Have you ever had the impulse to express yourself in other ways than by language, such as painting or modelling?
5. Give evidence that there is a tendency to respond to every stimulus by a movement, and for every idea to be expressed in movement. Illustrate how words may be used in place of other movements. Look up the root meanings of several words.
6. Is the growing custom of beginning to teach deaf children at an early age a good one? Why? If a deaf and a hearing child enter school at five, which should be farther along in language, the deaf child at twelve or the hearing child at nine? Why?
7. Can you express feeling by writing as perfectly as by talking? Why? Are children under ten affected as much by stories told as by stories they read? Why?
8. Report any instances you have observed of playful or imitative use of words by young children.
9. Report any observations you have made of the serious efforts of children to learn words.
10. Illustrate how necessity leads a child to learn to understand and use language.
11. State facts showing the prominence of one or another of the stages of language learning of a child you know.
12. Report just as many examples of childish mispronunciation as possible, and state the cause if you can. Compare tables of Lukens and Tracy.
13. Record and report vocabularies of children of about two years if possible, noting pronunciation and meaning and parts of speech of all words. Compare with Tracy, Moore, Gale, *et al.*
14. Record everything said by a child of two or three during an hour or two, and study to discover omissions and other peculiarities.

15. Report instances of children extending the rules for forming endings or in making new forms of words.

16. Report what you have done or observed regarding secret languages. Could not the playful tendency to make a language be utilized in the study of visual language more than it is?

17. Illustrate how the same kind of necessity that leads a child to learn oral language may be used in learning visual language. Illustrate in detail how oral language may be used to supplement visual, *e.g.* the teacher says part of a sentence and writes the rest.

18. Estimate your own vocabulary by counting all the words you know on every tenth, fiftieth, or hundredth page of the dictionary.

19. Let some one pose for children of the kindergarten or first grade while they draw. Examine the drawings. Bring in specimens of drawings of children not yet in school. Compare Barnes, Sully, Lukens, and Brown.

20. Have children of several grades illustrate a story, and make a study of the drawings.

21. Should drawing be taught children as an art or as a means of expression before ten years of age? Why?

Suggestions for Reading

On the general subject of expression and language, consult Romanes, *Mental Evolution in Man*, chaps. v to ix; Baldwin, Vol. I, pp. 221-262, and Vol. II, pp. 126-139; Whitney, *Life and Growth of Language*; Robinson, *Pop. Sci. Mo.*, Vol. LIII, pp. 784-798; Hale, *Pop. Sci. Mo.*, Vol. XXX, pp. 712-713; *Science*, Vol. XII, p. 145.

On the development of speech and vocabularies, see Lukens, *Ped. Sem.*, Vol. III, pp. 424-460; Tracy, chap. v, also in *Am. Jr. Psych.*, Vol. VI, pp. 107-138; Sully, chap. v; Preyer, Part II; Moore, Part IV; Taine, *Pop. Sci. Mo.*, Vol. IX, p. 129; Noble, *Educ.*, Vol. IX, pp. 44-52, 117-121, 188-194; Chamberlain, chap. v; Compayre, Vol. II, chap. iii; Gale, *Ped. Sem.*, Vol. IX, pp. 422-435; *Pop. Sci. Mo.*, Vol. LXI, pp. 45-51, or in *Univ. of Minn. Psychological Studies*; Sanford, *Ped. Sem.*, Vol. I, pp. 257-259; W. S. Hall, *Ch. S. Mo.*, Vol. II, pp. 585-608; *Jr. Ch. and Ad.*, January, 1902, pp. 1-13; Kirkpatrick, *Science*, Vol.

- XVIII, pp. 107-108, 175-176; Wolfe, *Ch. S. Mo.*, Vol. III, pp. 144-150; Jegi, *Ch. S. Mo.*, Vol. VI, pp. 241-261.
- On language teaching, see Groszman, *Ch. S. Mo.*, Vol. IV, pp. 266-278; Hinsdale, *Teaching the Language Arts*; Jacobi, in *Psychological Notes on Primary Education*, pp. 62-120; Iredell, *Educ.*, Vol. XIX, pp. 233-238. See also Williams, "Children's Interest in Words," *Ped. Sem.*, Vol. IX, pp. 274-295; Hancock, "Children's Tendencies in Written Language," *N. W. Mo.*, Vol. VIII, pp. 646-649; and Judd, chap. viii, on the process of reading, and chap. vii, on writing.
- On development of interest and ability in drawing, see Shinn; Brown, *Univ. of Cal. Studies*, 1897, pp. 75; Barnes, *Studies*, Vol. I, pp. 283-294, Vol. II, pp. 75-77, 163-179 (also a child's drawings in every number); Sully, chap. x; Lukens, *Ped. Sem.*, Vol. IV, pp. 79-110; Chamberlain, pp. 190-211; Hart, *N. W. Mo.*, Vol. VIII, pp. 193-196; Clarke, *Ed. Rev.*, Vol. XIII, pp. 76-82; O'Shea, *N. E. A.*, 1894, pp. 1015-1023; Gallagher, *N. W. Mo.*, Vol. VIII, pp. 130-134; Scott, *Trans. Ill. Ch. S. Soc.*, Vol. III, p. 12; F. Burk, *Ped. Sem.*, Vol. IX, pp. 296-323; Fitz, *Pop. Sci. Mo.*, Vol. LI, pp. 648-662.

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CHAPTER XIV

DEVELOPMENT OF INTELLECT

GENERAL PRINCIPLES

As we have already seen, the child begins life with little or no conscious intelligence, yet with well-marked reflex and instinctive tendencies to act for its own good. This unconscious mechanical intelligence controls the infant's action and enables it to survive. It also determines the general characteristics of conscious intelligence, for it determines the kind and sequence of movements and, to some extent, of sensations other than motor, as the child acts and reacts in ways favoring self-preservation. Conscious intelligence is developed by receiving and relating the sensations thus produced.

Since each new instinct modifies action, and since instinctive tendencies are the basis of interest, conscious intelligence is greatly influenced by mechanical and instinctive intelligence long after the early days of infantile irresponsibility are past.

As conscious intelligence develops, it chooses, from the various possibilities presented to it by the results of previous action, those objects and acts that are most pleasing. In every form of repeated action, however, conscious intelligence soon becomes more or less unnecessary because of the development of the uncon-

scious intelligence of habit. The chief difference between the intellect of the child and of the man, therefore, is that the child's actions are controlled largely by unconscious *instinctive* impulses and interests, and the man's by unconscious *habitual* reactions and interests. The conscious intelligence of the man is not essentially different from that of the child, except that the extent of its activity is greater because of more numerous experiences, and its direction different because of other instinctive and developed interests.

The problem of intellectual development is therefore simply one of determining the influence of instinctive tendencies upon its direction and vigor, and correlating these truths with all that is known of the effects of experience upon the growth of intelligence. All that physiology and psychology teach us of habit and association, as well as all that child study teaches us of the development of instinct, must be utilized in explaining the changes that take place with age.

In this study we must recognize that conscious intelligence may be gradually and unconsciously modified, as well as changed suddenly and consciously. This is demonstrated by Judd's experiments, in which persons who did not know the object of the experiment became more and more accurate in adjusting the parts of this line so as to make ac seem equal $a \rightarrow \text{---} | \text{---} \leftarrow b$ to cb . One who recalls accurately his former mental states will also recognize without experiment that his judgments have been unconsciously modified in various ways. When we take into account unconscious as well as conscious modifications of mind, we realize that the enormous differences between the intellects of adults

in general, and children in general, as well as between individual adults of different training, may be accounted for largely by difference in kind and number of experiences. Habits of analyzing, associating, and classifying, and standards of judgment, though influenced to some extent by instinctive interests, are largely determined by experience and training. Since the character of the intellect at each age is so largely the result of experience and so little influenced by inner laws of development, our study of the different phases of intellectual development will necessarily be more a study of general laws of psychology and habit than of innate laws of child development.

The most important question in regard to intellectual development is, as to whether special training of any kind produces general training of the mind as a whole or even of powers similar to those exercised. A thorough scientific training in perceiving flowers may or may not improve one's perception of rocks, or of ladies' hats. It was formerly assumed that training the attention, memory, or reason in one line of study increased one's power to attend, remember, or reason in all other lines. This is now being questioned.

Physiological experiments show that training one set of muscles increases the size or skill of other muscles that are frequently associated with them (especially the corresponding muscles on the other side of the body). In a similar way training in an intellectual act, such as discriminating the shape of leaves, may and must give exercise in concentration, and favor clear images and accurate retention; and it can scarcely fail to increase the accuracy of discrimination of the forms

of other objects so far as they are similar. If, however, the form and size are greatly different, the special training will increase the accuracy of judgment only slightly, if at all. Thorndike found that practice in judging the length of short lines did not improve the judgment as to the length of long lines. It seems altogether probable, therefore, that acquiring skill in one line does not increase skill in any other line except in so far as the activity is complex and requires that some of the powers that have been trained shall be used in the new act in the same way. If they have been used, but not in the same way, as when one is sorting the same kinds of cards, but putting one kind where he had formerly put the other (as in Bergstrom's experiments), the former training hinders, at least for a time, rather than helps. In the case of all acts that become fixed habits, special training probably does not directly produce general results.

In new and more purely intellectual acts, however, where the "idea" rather than the "trial and success" method of learning is used, consciousness, by singling out and combining the right elements of former activities, may at once utilize former special training in any one of a variety of ways. This peculiar power of the human intellect, by which it can go beyond any individual experience, is possessed in but a slight degree, if at all, by animals, which are almost wholly without the power of generalization. Hence all training of animals must be mechanical and special. A child or man who learns in that way gets nothing but the special training that is given him, while one who uses intelligence and insight while learning, goes forward by

leaps and bounds and is able to utilize his special knowledge and power in other ways. If one is practising such an exercise as tossing and catching two balls, his successes as compared with failures in catching the balls will increase but gradually, unless he uses insight and consciously chooses the best methods, such as throwing the balls so they will rise a little to the left of the centre of his body. If he takes advantage of such ideas, improvement is immediate rather than gradual.

The insight thus gained can then be used in throwing and catching anything. Without such insight the unconscious manual skill acquired by the practice in catching balls would be of little help in catching larger, heavier, or differently shaped objects. Probably only the more or less conscious generalizations made in special training are effective as general training, except where the parts of the processes are identical. It is important to bear this in mind in judging of the practical or general educational value of different kinds of knowledge and the utility of any proposed method of training.

DEVELOPMENT OF DISCRIMINATION

Discrimination is one of the most essential of all mental powers, and it seems to be greater in adults than in children. It may be doubted, however, whether the better discrimination of adults is not a matter of special knowledge and practice, helped a little by increased power of analysis and concentration. An Indian can read the signs of the passage of enemies or wild animals much more perfectly than the white man, who is so acute as to read little black marks on paper,

a sailor can see land long before the landsman, and a blind man can recognize persons by touch or sound with a readiness astonishing to a seeing man. In all these cases one seems to have greater power of discrimination than the other; but in every case it is probably wholly the result of special knowledge and practice. Each knows what signs to look for and what they mean, while the man of different training is familiar with an entirely different set of signs. Each has certain centres developed, but we cannot say that one has greater *general* power of discrimination than the other. The effect of knowledge upon discrimination is impressed upon one when he tries to read familiar sentences and unknown names in a dim light, or in poor writing, for one may easily be read while the other cannot be made out at all.

The extensive experiments of Gilbert upon children of school age, indicated that their power of discrimination of weight, distance, color, pitch, etc., increased from two to five times with age—a difference corresponding pretty well to that which may be produced in certain lines in a short time by special training. Since most of his tests were made in such a way that comparison and classification of a number of stimuli, as ten colors, were required, instead of mere discrimination between two, it is probable that the superiority of the older children was due partly to increased power of concentration, systematic comparison and expression, and partly to greater practice in making discriminations similar to those tested, and not at all to any fundamental difference in the power of discrimination of children and adults.

DEVELOPMENT IN RATE OF MENTAL ACTIVITY

The difference in the mental quickness or reaction time of children and adults is very marked, but it may be doubted if it would exist were both to face an experience equally new to both. It is a well-known fact that any act, physical or mental, can be performed more quickly after practice. The reasons for this are: (1) nervous impulses move more rapidly so that movement and thought are quicker; (2) they go more directly and continuously so that motion and thought are less diffuse, and (3) several series of impulses move at once, as when one is reading notes, playing with both hands, and singing at the same time.

It is not unusual for simple reaction time to be reduced one-half by practice; and complex tasks are frequently done, after a few months' practice, in from a half to a fifth of the time required for the first performance. Hence, it is not improbable that the difference in mental quickness of children and adults is entirely the result of incidental practice in activities that are the same, or partly the same, as those tested. The tests of Bryan, Hancock, and Gilbert, on rates of movement, and of Gilbert, Bentley, Partridge, and Curtis on reaction time, both simple and complex, show that from school age to maturity the rate of movement and of mental activity is not quite doubled, and that the improvement is greatest where there has been most special training, as in naming printed words, rather than naming pictures or objects; hence there is little reason to doubt that the difference between adults and children in rate of mental activity is almost wholly the result of training, either special or incidental.

INCREASE IN MENTAL GRASP

That the child's mental grasp is small, is evident from his first attempts at speech. He cannot keep several syllables in mind long enough to pronounce them all. His ideas are expressed by means of single words or gestures. Soon he uses two words, usually a predicate and object or modifier. His sentences grow longer as adjectives and other modifying words are added, but it is a long time before conjunctions are used and compound sentences formed. Complex sentences, which require even more mental grasp, come still later. A little girl of thirty-two months understood, when told to eat her potatoes with her spoon and her meat with her fork, but was unable to hold the four ideas in mind while she got the right words in which to express them. A few days later, however, she used her first conjunction in the sentence, "I pin it there *so* baby can get it." Children are often confused when told to do more than one thing, because they have not sufficient grasp of consciousness to hold all in the mind at once. The fact found in many tests, that children of school age read by words and cannot carry in their minds any but short sentences, while older children and adults read by phrases or even clauses, and can carry in consciousness enough of a long, complex, and compound sentence to give each clause the right expression, is very significant.

The experiments of Jacobs, Jastrow, Bolton, Smedley, and myself, upon children of school age, show that their ability to repeat or write a list of letters, figures, syllables, or familiar words, immediately after they have been heard or seen, generally increases with age by about one-

third, from the age of eight or nine to eighteen. As the reproduction is immediate, it is not so much a matter of memory proper as of mental grasp.

The cause of this increase in mental grasp with age is probably the same as that which makes it possible for us to hold in mind a long description of a route to be taken among familiar objects; while a short description of a route among unfamiliar objects cannot be kept in mind long enough perhaps to get started right. The same cause makes it easy for a skilful chess or checker player to see at once many more results of a move than he could when he began, or for an experienced musician to play with both hands, work the pedals, perceive the notes, and sing the words of a song all at the same time. In other words, ideas, or a series of ideas, and even combinations of several series of ideas that have become definite and well established, are easily held in mind, while indefinite and newly formed ideas can be kept in consciousness only in limited numbers and with effort.

The ideas of the child are largely new, while those of the adult are oftener old or connected with old ideas; hence the adult's mental grasp is greater chiefly because of knowledge and experience. The effect of knowledge on mental grasp is well shown by a series of experiments in which first-grade children and adults reproduce ordinary letters, Greek letters, and familiar sentences. The adults have little advantage in the case of Greek letters, a great deal in ordinary letters, and are almost infinitely better in reproducing the letters making a sentence. Evidently the difference is due to greater familiarity and increased mental grasp.

DEVELOPMENT OF PERCEPTION

Perception depends upon three things: (1) the sensations experienced at the moment; (2) power of discrimination, and (3) the results of past experiences that are reproduced more or less perfectly at the moment of perceiving. There is no reason to suppose that the sensations of children and adults differ materially. The power of discrimination varies, as we have seen, with special practice. The chief difference, therefore, in the perception of a child and an adult, is in the past experiences that are called up by the sensations.

Since the adult has many more experiences that may be suggested by a sensation than a child, there is a greater possibility of a wrong idea being awakened; but this is offset by greater power of discrimination, hence, though the adult is not always more quick in classifying an object or interpreting a sensation, he is likely to be more definite and accurate than the child who has fewer possibilities suggested from his limited experience, but who does not so readily analyze and note essentials. The difference is not, however, greater than that between adults of different occupations, such as a botanist and a milliner, a printer and a pilot.

The practical necessity in all perception is not to note the exact nature of the sensations produced by different objects and under different circumstances, but to recognize objects and react to them in the proper way. Nothing but a sphere gives, in all positions, the same visual sensations; hence we learn to know, not the apparent form of objects, but their real form. This "real" form, however, is simply the appearance which

they assume when perceived most clearly, *i.e.* when near at hand, directly in front, and at right angles to the line of sight. Other sensations vary also. For example, the sound produced by an object depends upon what it is struck with, as well as its distance; while objects vary in taste according as they are more or less hot or cold, wet or dry, etc.

Before the child enters school, he has learned to know just what appearances may be relied upon as indicating a certain form, sound, taste, or touch. He has also learned an immense number of correspondences between the different senses, so that he no longer needs to feel of most things he sees, in order to know, as much as he wishes, of how they will feel, or to strike or taste them, to know how they will sound or taste. Yet there are many appearances and correspondences that he does not know very well, and hence, as compared with adults, he is still at considerable disadvantage in judging objects. He also fails to note fine distinctions unless necessity requires it, for very different sensations have nearly the same practical meaning to him.

The necessity of identifying an object by means of sensations suggesting its "true appearance," rather than by the exact sensations it gives, together with the limited power of discrimination that children have, renders them very *suggestible*, or, in other words, undiscriminating as to whether a sensation is actually experienced or only called up by other sensations. Small found, that of children in the first grade about nine out of ten could be made to think that they experienced sensations of taste, smell, temperature, and visual movements, when no such sensations were

given them; while the proportion that could thus be deceived, became very much smaller in the higher grades. My own tests with ink spots also showed that critical judgment becomes more prominent than suggestibility in the fourth, fifth, and sixth grades.

On the other hand, the habit of the adult mind of looking only for essential characteristics may lead him into error when the conditions or his purposes change. For example, it is very hard for one who has been reading rapidly for the purpose of getting thought, to read a printed page for the purpose of correcting the proof. If the thought and language are very familiar, as when the proof is of an article by one's self, the errors overlooked are likely to be very numerous. Pillsbury's tests show that familiar words misspelled are frequently read without the error being noticed, and that letters spelling nothing are often seen as words. Children, therefore, sometimes notice mistakes in spelling and changes in the arrangement of things that are overlooked by adults, because the tendency to perceive certain words and arrangements is not so strongly developed in them.

Since the purpose of perception is to identify objects and make the proper reaction to them, and since the characteristics to be noted differ according to the end in view, quickness and accuracy in perception depend on discrimination *in relation to the end* to be gained. Definiteness and accuracy of perception can, therefore, only be developed by practice in perceiving *for a purpose*. Careful discrimination of sensations, analysis, and the discovery of essential characteristics, and the learning of what characteristics go together, so that

when one is experienced, others may be inferred, are the natural results of efforts to obtain practical ends. For example, in learning to tell when watermelons are ripe, the color, hardness, sound, and appearance of the melon and of the curl are discriminated, and their connection with the inside appearance and taste of the melon is noted. Or, again, in trying to build a house with blocks so that it will stand and look pretty, careful discrimination of form, position, size, and color of the blocks, and of their relation to each other, is necessary. Similar statements are true of nearly all games, plays, and construction in which children engage, as well as in drawing, writing, and all affairs of practical life.

The function of the teacher in such training is principally to put before the child interesting and definite things to be done or found out, and to occasionally direct his attention toward essential characteristics so that habits of analytic and concentrated attention will be developed. This gives a training in perception not to be gained by any series of exercises for the special purpose of training the senses only.

Since such training of perception is, in the nature of the case, special as regards the purposes directing it, general training in perception can be secured only by getting children interested not only in many things, but in many things from various points of view, as the practical, scientific, æsthetic.

DEVELOPMENT OF THE POWER TO IMAGE

True images are formed only when an object not present is represented, as when a child recognizes that some person or object is not in the usual place. Language

is probably an important factor in developing such images: the sound of the word "dog," being closely associated with the animal, calls up a visual image of him just as his barking does. Words are for some time almost as closely associated with objects as are the sensations concerned in their perception. The name of an object is really, to the child, a part of his perception of the object; hence it is not strange that a little boy put a curl at the end of the word "dog" he had written, to represent the tail, or that a little girl of three and a half readily learned the script word "cow," because the finishing stroke of the last letter looked to her like a horn or "hook," as she called it.

After a child has gained the power to form mental images, he takes much the same pleasure in forming them that he showed a little earlier in getting sensations of all kinds. His first interest in stories is largely the pleasure of forming mental pictures of all the familiar objects and acts named. It is some time before the connection of the parts of the story is of much significance to him.

By the time the child is three or four years old, the parts of short stories are connected so as to give a pretty good understanding of the story as a whole. This means that the mental grasp and power of constructive imagination is developed so that he can combine mentally several acts and images according to verbal direction.

Soon the child recognizes his power in this direction, and begins to combine mental images according to his own ideas. He now experiences something of the same pleasure that he felt when he got beyond the stage in



which sensations were changed for him by the action of other people, into the stage in which he effected the changes for himself by his own movements. His daily sensory activities have lost the charm of novelty, the stories told him have directed his imagining in a way that is new and pleasurable, yet this pleasure is dependent upon the will of others; hence it is an important epoch in the child's development when he learns that he can use the power of free creative imagination, and experience whatever combinations of mental images he wishes, independent of his surroundings and of the action of other people. It is not strange, therefore, that some children for several years live a large part of the time in this free imaginary world, which they people with toys, animals, and imaginary companions that conform to the will of their creator.

This imaginary world may seem as real and more important to the child than the world of solid reality; hence to tell what takes place in it is more pleasurable than to describe uninteresting realities. He tells imaginary experiences as naturally as an adult tells a dream, and no moral significance should be attached to the child's stories until he distinguishes between the experiences of the two worlds and learns to appreciate the desirability of making such distinction clear in all that he tells.

The child's images are often more *vivid* (at least as compared with the original perceptions) than in later life. Some children have difficulty in distinguishing images from percepts, so that their images are in reality hallucinations. It is probable that after definite standards of "true appearances" have been established, images

usually become less vivid with increased age, except at about fourteen or fifteen, when images are for a time probably more vivid.

One reason for decreased vividness of images is that one finds it necessary to note class rather than individual characteristics as he meets with many varieties. For example, lilies or turnips are easily pictured, so long as only white ones are known, and officers are easily imaged so long as only a few large, blue-coated policemen have been seen; but when many varieties have been met with, mental images are a less satisfactory means of thinking of each class of objects. The increase in vividness of images at fourteen or fifteen is probably correlated with physiological and emotional changes. After puberty, images become more or less vivid, according to the nature of one's mental operations. A student of an abstract subject is likely to image less, and an artist or anatomist, more vividly and definitely.

The studies of Phillips and others show that many peculiar number, form, and color associations originate in the early years, usually before entering school.

As regards *accuracy* of images, the results depend upon interest and practice. Wolfe found that younger children represented the size of pieces of silver money, of bills, areas of circles, and length of lines in inches, more accurately than either the fourth grade or the university students. My own studies, also, indicated that there is little difference with age as regards judgments of the size of a quart measure, distance apart of carriage wheels, number of wings and legs of a fly, etc. On the other hand, the power to image words, as shown by ability to spell, grows with age during school life.

As to *kind* of images most used, observation does not confirm the *a priori* view that taste and smell are more prominent in the mental life of the child than of the adult, for young children discriminate poorly with those senses, and are readily drawn from them by stimulating the eye or the ear. It is not likely, therefore, that they play much part in the child's mental imagery, especially as his chief food, milk, has little taste or odor. In general, for people in America, the changes in kind of imagery are from motor and auditory imagery to the visual, especially as regards symbols, such as words. According to Smedley, the climax of ability to reproduce auditory numbers is reached between thirteen and fourteen, and for visual numbers between seventeen and eighteen. The experience that the child has in the schoolroom of learning a visual language, learning visual signs for numbers, of studying things by means of pictures and diagrams, and of being required to perform mathematical and other operations by means of visual images, develops the tendency to represent everything visually. In the lower grades the child's words and numbers are auditory and motor; but as he reaches maturity, visual words and figures become more prominent, until finally adults can often understand visual language much better than auditory.

GROWTH OF CONSTRUCTIVE IMAGINATION


Constructive imagination depends for its development upon (1) the acquisition of mental images, (2) attention, or power of control of images, and (3) mental grasp.

(1) As bricks could not be made without straw, so constructive imagination cannot act without mental images.

(2) *Power of attention*, or control of mental images, is no less necessary. Constructive imagination differs from reproductive imagination or memory, inasmuch as images are not combined as they were in the original experience; and from creative imagination, inasmuch as the mode of combining images is not determined by the choice or the habits of the one imaging, but by the directions of another. Considerable power of attention or voluntary control therefore is necessary. In listening to a description of a house, for example, one must not give it color, size, position, material, etc., according to his past experience or his own taste, but picture each according to the description as he hears or reads the words.

The disposition of mental images is difficult to the child, for much the same reasons as is accurate control of movements. Yet if the words are familiar, the subject interesting, the arrangement of the ideas in accordance with the child's habits of thinking, and the rate neither too fast nor too slow, the words direct his attention so that little effort on his part is necessary. This experience in thus having his attention directed, prepares him to direct his attention according to the words, when not so interesting or so well arranged.

(3) Yet, however well the child's attention may be directed, his *mental grasp* is limited; hence complicated descriptions, which require that a number of things shall be kept in the mind at once, in order that they may be properly related, are beyond a child's powers. For these reasons, the ability of children to draw or do things according to direction is limited. The kindergarten child may be able to place the base of a triangle on the



top side of a square ; but if the number of figures and positions are several, he is unable to hold all the images in mind so as to construct the figure. For the same reason primary children are unable to make complicated things, comprehend long sentences, appreciate stories having many characters and incidents, or perform problems involving several numbers or conditions.

Since mental grasp in any line increases as ideas in that particular line become more familiar, the power of constructive imagination may increase much more in some lines than in others. A child, therefore, who can readily represent, visually, certain combinations of figures, lines, or letters, may fail in the less familiar ones, or find it hard to represent the result of combining two or more sounds, and hence be slow in word building.

The constructive imagination is called into play by stories, reading, arithmetic, geography, and history, providing they are taught as they should be, and by all directions such as are given in physical exercises. The proper understanding of lessons, and the development of accurate constructive imagination, cannot be brought about by allowing the pupil to perceive every object and combination every time, but by having them partly imaged and partly shown, then imaged by the help of simple pictures, diagrams, or gestures, and finally by means of words only.

DEVELOPMENT OF CREATIVE IMAGINATION

The essentials of creative imagination, aside from abundance of images from past experiences, are free activity and the impulse to create stirred by interest.

(1) *Free activity* means either spontaneous activity or

activity whose excitant is so subtle that it is not discernible. To put it in physiological terms, nervous impulses tend to diffuse themselves to parts that have not been active, or to pass irregularly from one established centre of activity to another. If there is a strong tendency to such activity, many unusual combinations of mental images will result, a large portion of which may be merely absurd or grotesque (as they usually are in dreams), but some of which are likely to be artistic or useful.

Careful training, which results in definite ideas and particular ways of doing things, if continued for a long time, checks the tendency to free activity and may destroy the power of creative imagination. It is for this reason that untrained men like Edison are often the most original. Definite training, with some imitation of various models, gives a good basis for the development of the creative imagination; but the training and the imitation must be varied and not too long continued in one line, or the material becomes "set" by habit, and can be arranged only in the customary ways. An artist, for example, who studies and imitates one school of painting only, for years, can never become an original painter.

(2) The *impulse to create* cannot be directly produced by training, since it comes from instinctive tendencies to construct and express, stirred by various emotions. It is especially strong when new experiences are met or new instincts come into prominence. One of the first emotions to stir the imagination is often that of fear, especially when the child is alone in the dark. Later the more æsthetic emotions stimulate the imagination. The

earliest creations are likely to be expressed in actions, especially in representative or dramatic plays, and in constructions, at first with blocks, then in making toys, forts, and machines. After several years of school life, oral language, music, and drawing, and a little later, written language, are the principal media of expression.

The subjects with which creative imagination deals are various, but are evidently determined by the emotional and instinctive interests prominent at different ages. Moreover, new experiences or ideas of one age become entirely familiar a little later, and hence do not excite the imagination unless they are brought into new relations. It is, therefore, impossible to say just what exercises are best to develop the creative imagination of a child or group of children, unless one knows the children; but we may say in general, that whatever stirs the emotions and excites a desire to do something stimulates imagination, and that previous experiences in perceiving good models, and in imitating, expressing, and constructing, furnish the conditions for its effective use. For example, to tell a child to write an autobiography of an oak tree when he knows little about how the oak tree grows, and less about what an autobiography is, would be absurd; but if he had recently heard several biographies, and had been studying about acorns and oaks, it is not improbable that he would have both the impulse and the necessary training that would lead him to write an imaginative autobiography. His previous experience in writing, as a mechanical act and as a means of expressing his own ideas, and his interest in autobiographies and in the growth of oaks, together with the special motive for expression, as, for example,

the desire to write a story that will please mamma when it is taken home, will, with other things too numerous and subtle to enumerate, influence the activity of creating and expressing.

Notwithstanding the fact that creative imagination is more dependent upon individuality, mood, and special circumstances than any other mental activity that may be classed as intellectual, yet there is nothing in mental life more certainly characteristic for different ages than the nature of the fancies as new instincts develop and emotional interests change. The boy's day dreams of a dog and a cart have no attraction for the youth who pictures himself rescuing a beautiful maiden, or for the business man, politician, or artist who dreams of his plans and successes. Learoyd and Calkins, who secured by inquiry an account of continued stories carried on in the minds of one hundred and seventy-five persons, found that in the younger years such stories were usually concerned with fairies and martyrdoms, in late childhood and youth with romance and adventure, and in maturer years with practical affairs.

DEVELOPMENT OF MEMORY


As already shown, mental grasp or memory span, in reproducing impressions just received, increases with age in a marked degree. The increase in power to recall after an interval of time, which is more properly called memory, is much less. Jastrow found that university students remembered only 1 or 2 per cent more words after an interval of three days than high school students five years younger. My tests showed little difference in the reproduction after three days, of words

seen or heard and objects shown, by children from the third grade up to college students, except that the memory of the older persons was more voluntary and less ready and spontaneous. Shaw found that a story consisting of three hundred and twenty-four words, and nearly half as many distinct facts, was reproduced more than twice as fully by pupils of the ninth grade as in the lowest grade tested, and as well or better than by high school or university students. He counted as correct, facts expressed in other words than those given in the story. The greater difference with age in this test, compared with others, is probably because it involved associations of ideas instead of mere retention of impressions. If we take into account the slight mental grasp of the children and the length of time required for them to express what they remembered in writing, the difference in memory of impressions is almost nothing, and in memory involving associations of ideas is not very great.

The receptivity and retentiveness of the child's brain is probably as great as that of the adult. The difference in the memory of children and adults is, therefore, a difference in kind rather than in degree, and is caused largely by experience. Nothing that can be used as a memory test is as new for the adult as it is for the child. The adult already knows a part of what he is given to remember, or, in other words, certain brain centres have already had practice in reproducing such impressions. In the adult brain also, where many centres are already well practised, new impressions readily run into the old channels ; hence impressions are easily classified, and their centres readily awakened to activity again because of their connection with centres frequently called

into action. Finally, the adult mind has more power of voluntary attention, both in receiving impressions and in trying to reproduce them by holding in mind some idea connected with them. As a consequence, the spontaneous and unclassified memories of adults are not better than those of children, if they are as good, while their voluntary and systematic memories are better.

The above differences are most marked between children and well-educated adults, while adults without systematic training differ but little from children in this respect. The trained mind has much greater power of attention, and a much more definite system of classified ideas, or, in physiological terms, more distinct centres of activity and paths of association. Development of memory is, therefore, largely a matter of training in habits of attention and in methods of classifying impressions. Most improvement in memory is special, certain classes of things only being attended to, classified, and remembered, while others are unnoticed, and consequently not remembered. If discoveries or improvements in his special line are read, respectively, by a historian, a botanist, a chemist, a psychologist, a bicyclist, a civil engineer, or a doctor, each readily attends to, classifies, and remembers the facts of his specialty; but all would experience great difficulty if they exchanged memory materials. So special is the development of power in these directions, that one man may remember figures indicating dates readily, but utterly fail to remember a list of prices readily recalled and quoted to him by a business man. One mathematician who could repeat in order as high as fifty-two figures, could not repeat more than eight or nine letters given orally as were the figures.



Memory for isolated impressions, and in fact for nearly all things that are largely sensory, reaches its climax early in the teens. The plasticity of the brain probably decreases after puberty, and further improvement in memory is special, conceptional, associative, and only along lines in which one has already started; while the tendency, and in part the ability, to acquire and retain facts in other lines after a while decreases until in old age the number of facts acquired each year is very much less than the number that are forgotten.

DEVELOPMENT OF CONCEPTS

The child is largely engaged in sense perception, and thus his thought processes are not far removed or easily distinguished from his sense activities. The sight of its mother by a child of six months may produce some expectation of auditory, tactile, and other sensations that have been previously experienced in connection with seeing her. There is, however, probably no distinct or separate representation of each of these sensations; yet other persons, as well as the mother, are distinguished from chairs, beds, and other inanimate things, and call up a different class of images. There must therefore be the beginning of the concept of a class of objects which we know as persons with common characteristics differing from those of inanimate things.

This crude form of concept, much like that of animals, may be formed without language. This must have been the case when a child, less than a year old, who was shown a bird, turned and looked at a stuffed bird in the room, and when another child, a little over

a year old, showed surprise and fear at an envelope that seemed to move of itself, which was contrary to her idea of that class of objects. A child can sort blocks, putting those of a color together, before he can point to, or give them as they are named. In the case of M. this was true for a year. He also forms class ideas before he uses class names. For example, men are distinguished from other objects, and from women and children, by the particular name "papa," but they are not all treated as that particular individual is; hence papa is not only perceived as an individual, but there is a crude concept of the class to which he belongs. There can be no doubt, however, that language is an aid in the development of thought, and a necessary factor in all general and abstract thinking. There is nothing in general and abstract concepts such as "organism" or "color," by which they can be recalled or indicated, except a sign or symbol of some kind that can be associated with the common element in the variety of experiences giving rise to the concepts. A word is a convenient mode of reacting to all members of a class of objects, and therefore an important part of the concept as well as a means of recalling and expressing it.

The first few hundred words and concepts are gotten by children through direct association with objects and experiences. These first words help in gaining other concepts and words as the child hears them in remarks and stories, and in answers to his questions. Often for several years the child's questions show that he is learning the general qualities of things of which he is trying to form concepts, *e.g.* "Is iron heavier than wood?" "Will iron burn?" "Is there anything stronger than

iron?" "Where do we get iron?" or again, "What do policemen do?" "Where do they live?" "How strong is a policeman?" "Is he stronger than you?" "Do they always have a club?" In school, formal definitions, special study, and reading become important means of acquiring concepts and making them more definite.

Three degrees of definiteness of concepts may be named: (1) one in which a class of objects can usually be distinguished from other classes in ordinary experience, but whose distinguishing qualities have not been picked out or named, as when a child can tell dogs and cats apart, but cannot state the difference. (2) A stage in which one or more of the most evident characteristics that distinguish one class of objects from other classes, as dogs "bark" and cats "mew," may be stated. (3) Perfect concepts in which all the distinguishing characteristics can be named, or, in other words, when a scientific definition can be given, as, "A parallelogram is a plane figure whose opposite sides are parallel and equal." A young child's concepts are all of the first degree, while the most cultivated man probably has some of the first type, and a good many of the second; while few of his concepts outside of the lines to which he has given special study are of the third degree.

The difficult task of finding what concepts of common things, of the second degree of definiteness, are possessed by children upon entering school, has been attempted in Berlin, Boston, and other places. As a result of such study, Dr. Hall concludes: (1) "There is next to nothing of pedagogic value, the knowledge of which is safe to assume, at the outset of school life. (2) The best preparation parents can give their

children for good school training is to make them acquainted with natural objects, especially with sights and sounds of the country. (3) Every teacher, on starting with a new class, or in a new locality, to make sure that his efforts along some lines are not utterly lost, should undertake to explore carefully, section by section, children's minds with all the tact and ingenuity he can command and acquire, to determine exactly what is already known. (4) The concepts that are most common in the children of a given locality are the earliest to be acquired, while the rarer ones are later." Some of the striking per cents of ignorance of the Boston children are as follows:—

Robin	60.5	Ankles	65.5
Pig	47.5	Elbows	25.0
Chicken	33.5	Dew	78.0
Elm tree	91.5	Woods	53.5
Wrist	70.5	Hill	28.0

DEVELOPMENT OF REASONING

The beginning of practical reasoning is found, physiologically, in the instinctive tendency to do under similar conditions what has been done previously with favorable results, and to refrain from doing what has brought unfavorable results. A child, when uncomfortable, instinctively cries, and after a few months, if a continuation and increase of crying effort has always been followed by some one's coming to the rescue, habit establishes this method of obtaining relief. Some months later the child not only has this physiological tendency, but he is conscious of crying as one method of getting things, in much the same way that he is con-

scious of reaching, as a means of getting objects. A year or two later the child may be so conscious of crying as a means that has secured desired ends, that he makes the cry with a purpose, instead of merely allowing it free course or increasing the instinctive tendency to cry. In this the child's reasoning is not much beyond that of an intelligent dog that lies down, rolls over, or "speaks" for a piece of bread.


In all the child's experiences during the first few years as he learns to reach for things, keep them from falling, maintain his own equilibrium in various positions, walk, climb, fall without getting hurt, avoid the stove, use a spoon, or pile up blocks, instinct is the basis of the practical reason which is developing in a remarkable degree.

On the conscious side he is guided by sensations, percepts, and images of particular experiences that were like those now occurring. He usually knows practically that things have to be held or something put under them or they will fall, by the middle of the second year; but it is many years before he actually thinks the general truth, "unsupported bodies fall," though he soon has representations of particular, unsupported bodies falling. Hence, though children make practical inferences at an early age, it is often a long time before they reason in a general and abstract way.

As soon as children begin to learn language they are implicitly generalizing, classifying, and reasoning as they apply the words to new objects. Probably not until between three and four years of age do children begin to consciously and explicitly generalize, and then the generalization consists, at first, of several similar

particulars, as the following remarks of a little girl when about three and a half years old indicate. After having often asked and been answered as to where various things came from, she asked, "Where did I come from?" and was answered, "You grew." Later she asked: "Where did papa come from?" "Where did mamma come from?" "Where did grandma come from?" Later when told the baby had two legs, she asked: "How many legs has papa?" "How many legs has mamma?" and so on for the several members of the family. At this time general statements did not satisfy her. When told she did things for papa, she asked, "What do I do for you?" and would not be satisfied with the answer, "Lots of things," till a particular thing, "You get the paper for me," was named. A few days later such remarks as the following were common, "When I get big I will go to the gymnasium, the library, the normal school, kindergarten and *lots of places*," showing that her ideas were getting slightly broader and more general than the particulars named.

A little later a conscious attempt to generalize and classify was indicated by the following, "The coffee pot won't break, but the cup will break and the saucer will break and the sauce dish will break," etc. The crudeness of her ideas, however, was shown by the fact that when questioned, she said that the silver sugar-bowl and pitcher, and even a spoon, would break, notwithstanding she had often dropped spoons without their breaking. Practically, she handled cups and spoons differently; but when she talked of them consciously, no memory of different experiences with them



occurred to her to prevent her putting them both in the class of breakables.

In all the earlier attempts at reasoning, images of past experiences compose most of the "train of reasoning," and personal actions or commands to self are transferred to others, or of others to self, as the following examples illustrate. To papa, "You eat something else first, then you can have some cake." Having been told that she could have something when it was noon, she later asked, "Has noon gone?"—"No, noon is coming."—"Has noon footies?"—"No."—"How does the noon come, then?" perhaps thinking vaguely of other ways of coming, as by means of wheels. It was explained to her that we called it noon when the sun got up high so we had to look up straight to see it. Several times after that on cloudy days she said at dinner that it was not noon, for she could not see the sun, which shows how largely her "thoughts" consisted of definite sensations and images. One day the following conversation between her and her father occurred: "When I get big, I will pop the corn and you won't have to do it, will you?"—"No."—"You will be a little girl then, won't you?"—"No."—"Yes, you will." She had previously learned that she would get big, and that papa had been little, and she had often changed places with others, as, "You hide now, and I'll find you," and so she probably pictured herself as a big man popping corn, and papa as a little girl standing by as she was then.

The child is continually gaining new truths that are general in the sense that they can be applied to a number of particulars; his conceptions are increasing in

number, and passing from the first to the second stage of definiteness as he becomes conscious of common characteristics and important differences in various classes of objects; and he is continually trying to find out and apply general truths, though he often discovers that their application is more limited than he expected, as when he goes out in the rain so he will grow, or plants money or a ring expecting it to produce more.

In the following from a boy of four who has an unusual tendency to generalize, the induction seemed to be conscious: "All things that will run, like water and milk, will wet, won't they, papa?"

The child gets his general truths (1) from practical experiences, without being conscious of them as general truths; (2) from adults, perhaps in answers to such questions as: "Where do apples come from?" "What are you putting that pie in the stove for?" "What is it made of?" "What makes flowers grow?" and (3) from his own generalizations and inductions, though these are often more a recognition of similarity of particulars than genuine abstract generalizations. In other words, he goes from one particular to another, instead of reaching a generalization inductively, then applying it deductively as does the logician. For example, a boy of five who saw white caps in the water overflowing a meadow, and asked, "Is there soap under every one of those waves?" evidently remembered other appearances like that, produced by soap in water, and thought of the same cause in this case without going through any such logical course of reasoning as the following: (1) (inductive) "I have observed such appearances produced in water by soap and by nothing else.

What is true of the cases I have observed is true of all ; therefore, such white stuff on the water is always produced by soap." (2) (deductive) "White stuff on the water is always caused by soap ; that water has white stuff on it, therefore there must be soap in it."

Whatever the source of the general truth involved in a child's reasoning, he is likely to apply it not only to the class of objects or conditions to which it belongs, but also to others, and many of his mistakes in reasoning are due to this fact. This is not because his generalizations are so wide, as one might think, but because they are so indefinite and indiscriminating, as are also the concepts with which they are concerned ; hence as soon as he notes similarity to something familiar, and pictures what was true of it, he expects that the same will be true of what seems like it. This is true even when the similarity is only in name. For example, a little girl of five, who had borrowed an eraser of a young lady several times, was told that a plant in the window was a rubber plant, when she quickly exclaimed, "Oh, that's why you always have so many rubbers, isn't it ?"

In other instances the characteristic to which the truth is attached is not an essential one ; hence the truth is wrongly and often too narrowly applied, as when a boy of eight said, "You should not call him Mr., he is not married yet." In reality this and many similar mistakes come from too wide a generalization previously made, which in this case probably was, women who are married change their title ; hence all persons do so.

The numerous mistakes in reasoning that a child makes often lead to his being laughed at, and this tends to discourage him somewhat in original thinking,

and to make him rely more upon others for his general truths.

When he enters school the conditions are usually unfavorable for developing his power and tendency to reason. Before this, his practical reason was exercised in his plays and experiences with real objects and situations, and his conclusions were usually of immediate value to him. Though some of his reasoning had been conscious, and some of his thinking animated by pure curiosity, yet much of it had been influenced by practical interest of some kind, while nearly all of it had been concerned with persons, things, and incidents in his immediate environment. In school, conscious reasoning is usually appealed to, and there are almost no opportunities for the child to use his practical reason in doing things. The school studies, especially arithmetic, are supposed to be adapted to the development of the child's reason; but the appeal is almost wholly to conscious reasoning, which, unaided by the practical reason and the stimulus of interest in the conclusions that always accompanies reasoning in acts instead of in thought, is not very vigorous.

His arithmetical thinking is also very imperfect because it is not usually appealed to sufficiently through the senses and through images of definite individual experiences, which, as we have already seen, naturally occupy a large place in a child's reasoning. So many truths are presented to him, and they are applied so often without the results or conclusions having any bearing upon his present actions, that he does not care particularly what the truth is, or how it is applied, providing he can say or do what will satisfy the teacher.

In short, the effect of school life is usually inimical to the activity of reasoning, at least for a time.

The ordinary child in the public school exercises his practical reason less in the first half-dozen years of school life than does the ordinary street urchin. Yet the schoolboy acquires a great many valuable concepts and general truths, and forms habits of orderly analysis and synthesis which enable him, when his reason awakens to full activity again (as it is likely to do in his teens), to far surpass the street urchin, not only in more abstract reasoning, but with some practice, in the reasoning involved in practical affairs. The training in the school is not, therefore, valueless, but it produces a break in the development of reasoning that is sometimes never even apparently repaired.

Naturally, reasoning is first instinctive, sensory, and practical, then conscious, imaginative, and individual, and finally abstract, analytic, and general. The school unsuccessfully seeks to develop the last form of reasoning before the others, which are a necessary basis for it, are sufficiently developed.

After about twelve years of age, a child's interests usually broaden so that he is no longer almost wholly concerned with his own affairs and with particular results, but begins to develop a social and speculative interest in groups of persons and classes of objects and events. By this time the child has also acquired enough concepts and general truths, together with the power of analyzing and discriminating difference and likeness, so that he now has the power as well as the impulse to reason in a general and abstract way concerning persons in history, words in language, and things in science.

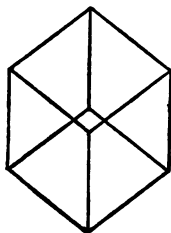
What is needed more than anything else to develop the reasoning power of children in school is that they shall have more opportunity to work out for themselves methods of doing things which they are immediately interested in doing, and more practice in discovering the results of particular acts and conditions, before they are expected to reason in an abstract way about classes of things in which they have no immediate or practical interest. It is also important, especially in arithmetic, that they shall have much practice in applying general truths to various classes of problems, without anything to show them which general truth will fit each particular case. In other words, their need is not more general truths, but more practice in discerning essential characteristics and applying truths.

Exercises for Students

1. If similarity in mental processes helps one person in understanding another, are teachers who are studying some new subject likely to succeed better in teaching than those who are not? Why?

2. Give a number of illustrations of special training that does or does not increase general mental power.

3. As a means of showing that our perceptions become definite regarding familiar things, note the fact that a figure like the accompanying one may be seen in two or three definite and familiar ways, but not in any intermediate or confused way. Note, also, how easy it is to hear sounds and nonsense syllables as words. Is this true to the same extent of children?



4. Give illustrations of differences in the discrimination of individuals, and indicate how far they may be explained by special knowledge and practice.

5. Test first or second grade children and adults by having them make a straight line, then a word as many times as possible in a minute, and note the difference in rate of activity and the causes of the difference.

6. Report tests and observations showing difference in mental grasp of children and adults.

7. Give illustrations showing that differences in the perceptive power of adults may be as great as are to be found between children and adults.

8. Why do people who have never studied drawing usually say that a circle looks the same in all positions? Give other illustrations of the ignoring of variations in sensations, in perceiving objects as the same.

9. Have students experiment and report on weight and size illusions.

10. Show children successively sticks of the following length in inches: 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4, 4, 4, 4, and see if they get the suggestion, that each line is to be larger than each of the preceding. Show a series of lines drawn on paper of the above lengths, and ask the children to point to one three inches long, then just as the child is doing so, say, "Are you sure you are right?" Report other observations and experiments showing the greater suggestibility of children as compared with adults.

11. Show to adults for a moment the name of your city or some other familiar word, with some letters omitted and similar ones substituted, and see if familiarity with the word does not lead to error. Report other observations and experiments showing that knowledge and habit may lead to error.

12. To get an idea of how large a part purpose plays in perception, look at a book with one after another of the following purposes: to know the name and author, to know regarding the capitalization of letters, the size of letters, spacing and design on the back, to determine the quality of the binding as to material and color, to see if the book is perfectly new and clean, to see if its edge is smooth and straight so it can be used in place of a ruler, to determine its size in inches, to judge of the quality of the paper. Find other illustrations of how the purpose in perceiving, rather than the mere power of discrimination, determines what shall be perceived.

13. Is there any relation between manual training and sense training? Explain fully.

14. Give illustrations of the imaging power of children.

15. Is your image of a wooded hill that you have seen many times at various seasons of the year as definite and vivid as some landscapes you have seen only a few times? Give other illustrations showing how increased experience may lead to less definiteness and vividness of images.

16. Report from experience, observation, or reading, instances of letters or numbers, which always call up images of certain colors or forms.

17. Is it better to tell children of the second, third, or fourth grades something you wish them to remember, or to have them read it? Why?

18. Try with children and adults some such experiment as the following. Say, "Make a dot two inches from the top of the page and one inch from the left edge, then from it draw a line to the right two inches long, then downward three inches, then to the left one inch, then upward an inch, then to the dot first made," and see how well they follow directions, or say, "Think of a square with a triangle on top with point upward, a circle underneath, and an oblong on each side with ends next the side of the square."

19. Illustrate from school work, successes or failures of children due to good or poor constructive imagination.

20. What is the effect on the creative imagination of always telling children not only what to do, but also just how to do it?

21. Mention a number of exercises that you think would give good training to the creative imagination, in which you recognize a stage of imitation and practice, and another stage of free creation, indicating the grade to which these exercises would be most suitable.

22. Find how many words a child of two uses, as an indication of the number of concepts he has.

23. Attempt to determine what concepts of common things, of the second degree of definiteness, a child of from four to six has.

24. It will be interesting for students to try to gain some idea of how many concepts they have by counting the words familiar to them on every tenth or hundredth page of a dictionary, and estimating their total vocabulary.

25. Give a number of instances of childish reasoning from observation or reading, and explain the modes of reaching a conclusion in each case.

26. Give illustrations of work in school studies, so planned that the reasoning may be simply a means to an end the child desires to reach.

27. Give such problems as these to children, and explain why they make mistakes. "A boy walked directly east three miles, then directly west three miles, how far was he from where he started?" "If a stalk of corn two feet high grows two feet in the month of July, how much will a peach tree three feet high grow in the same time?"

28. Algebra may be described as arithmetic generalized. Why is it better suited for older pupils than arithmetic?

29. Have children find out what you are thinking of by asking questions that you answer by yes or no. Notice how many of their questions are particular or ignore former answers, and hence show lack of conceptional thought and reasoning.

30. Tell a story, such as the following, with many contradictions in it, and ask children to give their reasons for thinking it is or is not true. Notice in how few cases they put parts together so as to show their logical contradictions. "The water would not be very warm if it was winter" is a logical reason, while "His father would not have praised him" is merely reasoning according to probabilities.

A BOY'S FIRST FISH

One winter afternoon a boy went fishing in a lake a short distance from his home. He had a bent pin for a hook, and a thread for a line, which he fastened to a good strong pole. As soon as he threw the hook in, a fish took it in his mouth and started downstream. The boy began to pull, but his foot slipped and he fell into the river. He was frightened at first, but when he found that the river was shallow and the water very warm, he did not care, but held to the pole. He waded to the shore and pulled till the pole bent and almost broke before he could draw the fish out of the lake. When he got it out he saw that it was about eight inches long and he was very much pleased. He tried to catch more, but they would not take the hook.

His hands got cold in the wintry wind, so he started home with the fish. He got very tired carrying the heavy fish so far, but forgot all about it when he got home, and his papa praised him for holding to the pole, and his mamma said the fish would make several nice meals for all of them.

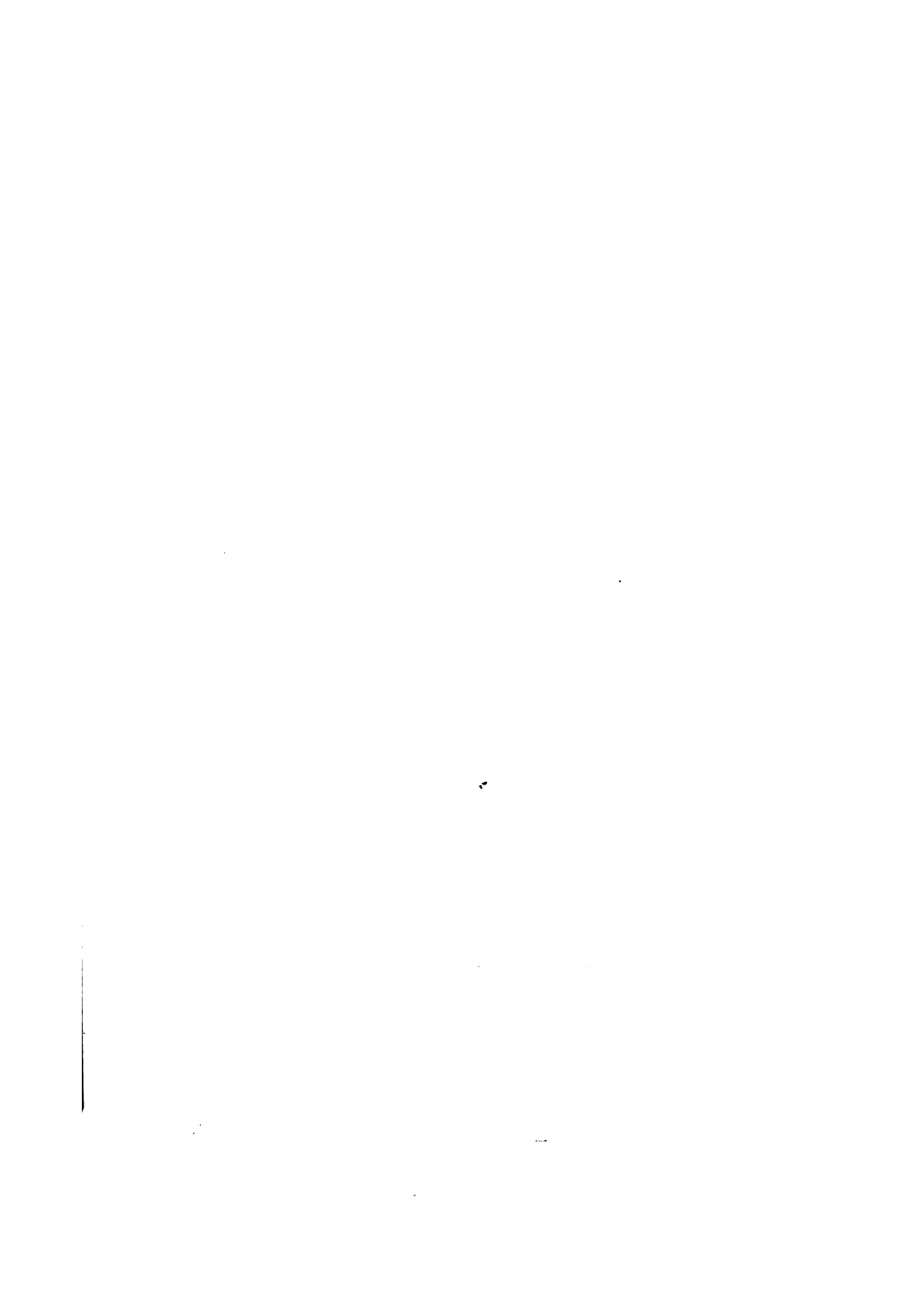
Suggestions for Reading

On the general subject of intellectual development and training, see besides psychologies, Baldwin, Vol. I, pp. 301-332; Hinsdale, *Studies in Education*, chaps. ii and iii; Judd, chaps. i and ii, and *Ed. Rev.*, Vol. VIII, pp. 128-142; Compayre, Vol. I, chaps. vi and vii, Vol. II; Thorndike, *Human Nature Club*, chap. xv; *Jr. Ped.*, Vol. XIV, pp. 60-65; Thorndike and Woodworth, *Psych. Rev.*, Vol. VIII, pp. 247-261, 384-395, 553-564; Aiken, "Methods of Mind Training"; Allen, *Jr. Ped.*, Vol. XIV, pp. 237-254; Bergstrom, *Am. Jr. Psych.*, Vol. V, pp. 256-369; Swift, *Ped. Sem.*, Vol. X, pp. 3-22; Hugh, *Ped. Sem.*, Vol. V, pp. 599-605; Bryan and Harter, *Psych. Rev.*, Vol. IV, pp. 25-53, Vol. VI, pp. 345-375; Andrews, *Am. Jr. Psych.*, Vol. XIV, pp. 121-149; Johnson, *Yale Studies*, Vol. VI, pp. 51-103; Swift, *Am. Jr. Psych.*, Vol. XIV, pp. 201-251.

On the senses and early intellectual development, consult Preyer, Shinn, Tracy, Moore.

On discrimination, rate of mental activity, perception, suggestion, and illusions, read Kirkpatrick, *Psych. Rev.*, Vol. VIII, pp. 567-577, Vol. VII, pp. 274-280; parts of Gilbert, *Yale Studies*, Vol. II, pp. 40-100; *Iowa Univ. Studies*, Vol. II, pp. 1-84; Christopher and Smedley's *Reports of Child Study Investigations to the Chicago Board of Education*; Judd, *Psych. Rev.*, Vol. IX, pp. 27-39; Small, *Ped. Sem.*, Vol. IV, pp. 176-220; *N. W. Mo.*, Vol. IX, pp. 134-135; Sidis, *Psychology of Suggestion*; Pillsbury, *Am. Jr. Psych.*, Vol. VIII, pp. 318-396; Bolton, *Psych. Rev.*, Vol. VIII, pp. 537-548; Jastrow, *Fact and Fable in Psychology*, pp. 106-136, 275-295; Binet, *Psych. Rev.*, Vol. VIII, pp. 610-616; Pillsbury, *Am. Jr. Psych.*, Vol. VIII, pp. 315-393; Dressler, *Am. Jr. Psych.*, Vol. VI, pp. 343-363; Seashore, *Yale Studies*, Vol. III, pp. 1-67; *Iowa Studies*, Vol. II, pp. 1-64.

- On mental images, see Galton, *Pop. Sci. Mo.*, Vol. XV, p. 572; Vol. XVIII, p. 64, or consult his *Human Faculty*; Patrick, *Pop. Sci. Mo.*, Vol. XXXIX, p. 761; Kirkpatrick, *Science*, October, 1893; Binet, *Pop. Sci. Mo.*, Vol. XLI, pp. 60-70; Bryan, *N. E. A.*, 1893, pp. 779-781; Talbot, *Am. Jr. Psych.*, Vol. VIII, pp. 414-417; Hall, F. H., *Jr. Ped.*, Vol. XIV, pp. 214-223; *N. E. A.*, 1897, pp. 621-628; *Ch. S. Mo.*, Vol. VI, pp. 297-307; Wylie, *Ped. Sem.*, Vol. IX, pp. 127-160; Jastrow, *Fact and Fable in Psychology*, pp. 337-370; Philipps, *Am. Jr. Psych.*, Vol. VIII, pp. 506-527; Wolfe, *Am. Jr. Psych.*, Vol. IX, pp. 137-166.
- On memory, see Colgrove, especially chap. v; Eldridge-Green, *Memory and its Cultivation*, Part I, chaps. vii and viii and Part II; Waldstein, *The Subconscious Self*; Bolton, *Am. Jr. Psych.*, Vol. IV, pp. 298-301; Shaw, *Ped. Sem.*, Vol. IV, pp. 61-78; Kirkpatrick, *Psych. Rev.*, Vol. I, pp. 602-609; Jastrow, *Ed. Rev.*, Vol. II, pp. 442-452; Patrick, Vol. IV, pp. 463-474; Barnes, *Studies in Ed.*, pp. 58-61; Jacobs, *Mind*, Vol. XII, pp. 75-82.
- On associative, creative, conceptive, and reasoning activities of children, see Bolton and Haskell, *Ed. Rev.*, Vol. XV, pp. 474-499; Barnes, *Studies in Ed.*, Vol. I, pp. 41-52; Vol. II, pp. 43-61, 373-387; Royce, *Psych. Rev.*, Vol. V, pp. 113-144; Hall, *Ped. Sem.*, Vol. I, pp. 139-173; Lindley, *Am. Jr. Psych.*, Vol. VIII, pp. 431-493; Brown, *Ped. Sem.*, Vol. II, pp. 358-396; Gale, *Jr. Ch. and Adoles.*, July, 1902, pp. 149-74; Hancock, *Ed. Rev.*, Vol. XII, pp. 260-268; Learoyd, *Am. Jr. Psych.*, Vol. VII, pp. 86-90.



CHAPTER XV

HEREDITY

MEANING

HEREDITY is the term applied in biology to the production of the like. The fact that the offspring of plants and animals always belong to the same species as their parents is named if not explained by the word "heredity." In the term is used by stock-breeders and students of man, however, it has a more restricted meaning. It then refers not merely to the likeness in species, but to the less-marked characteristics that distinguish different breeds or families of the same species. A negro's child is not merely a human being, but he is a human being of the black type. A Bach is, as a rule, not merely a human being, a Caucasian and a German, but also a Bach in the sense of being a musical genius. The context will usually show whether the term is used in the narrower or the broader sense. In both senses, the laws and the fundamental phenomena are the same. A minute cell formed by the union of a cell from a male with the cell of a female of the same species develops into a being similar to its ancestors, both near and remote, and yet not exactly like any one of them.

The characteristics of every animal and person are determined not only by the union of cells from two lines of ancestry, but also by the environment which begins

to act as soon as the embryo is formed, and continues to mould the developing organism till birth, then in a still greater variety of ways until maturity. The changes produced before birth are often very marked, since a nervous shock to a mother four or five months before the birth of a child often results in some deformity in the child. It is claimed but not admitted by physicians that the physical and mental condition of the mother during the entire time the child is carried, affects its development in a marked degree. The special characteristics this gives a child are congenital, not, properly speaking, hereditary. In common language they are often spoken of as hereditary, but in a scientific sense only those characteristics that come from the union of two germ cells are hereditary.

GENERAL TRUTHS OR LAWS OF HEREDITY

(1) *Children usually resemble their parents.* A child is, however, never exactly like either the father or the mother, nor does he possess the sum of all the characteristics of both or an equal fusion, but surely some of each. The prominent qualities of one parent or the other, rather than a fusion of those of both, frequently appear in the child. For this reason we find black-haired and red-haired children in the same family, instead of all with hair of an intermediate color. The child usually has also characteristics not possessed by either of his parents. The resemblance to a grandparent or even a more remote ancestor, or to a relative not in the direct line of descent, as uncle or cousin, may be more marked than to the parents.

(2) This suggests the truth that *inheritance is not*

simply from parents, but from the two lines of ancestry of the two families. This view is supported by the fact that stock-breeders cannot predict the characteristics of the offspring of mongrels or mixed breeds, while they can of those known to have been of pure blood for many generations. Going back a generation at a time one finds the number of ancestors increasing geometrically as follows: 2, 4, 8, 16, 32, etc., so that in the tenth generation there are a thousand ancestors. This shows why, when there are various breeds or families represented, it is impossible to predict the result of the union. On the other hand, when the ancestors are all from one line, the results can be predicted with some accuracy. So far as the facts are known it appears that the offspring of two parents of different lines of pure breed will, other things being equal, most resemble the one that has been kept pure the greatest number of generations.

In the human race there is far less pureness of breed than in animals. A practically pure breed of animals, pairing every year, can be established in five or six years; while to establish a pure breed of human beings, even if a regular plan were followed as is done with domestic animals, would require a century and a half. Again, since human beings move about much more than other animals, the people of any given locality are, as a rule, of much less pure blood than the various species of animals in the same region. Migration, wars, and inter-marriage have resulted in the mixing of blood from almost all portions of the globe. The results of heredity in human beings are therefore, under ordinary conditions, infinitely more difficult to predict than in

animals; yet the results of union among distinct races, such as the Caucasian and Negro, are fixed and well known.

(3) *There is a tendency to return to the normal type.* For example, even when both parents vary from the normal in the same way, the offspring usually do not show as much variation as the parents. The children of a large father and mother are usually larger than the normal, but smaller than their parents; and children of a small father and mother are usually smaller than normal but larger than their parents. The son of an unusually strong or brilliant man is likely to be less strong or brilliant than himself; but on the other hand the son of a man diseased or of unusually small capacity is likely to be more healthy and intelligent than himself.

(4) *Heredity is often of a general capacity rather than of a specific ability.* For example, the son of a great scientist may become a great writer or attain great success in business or politics. Moreover, nervous irregularity in the parents may appear in the children in the form of imbecility, insanity, or criminality.

(5) Where there is close *in-breeding*, it has been thought that weakness, especially mental, is likely to appear, and some of the royal families that have intermarried and degenerated are cited as evidence. Recent writers, however, are inclined to think that where weakness results from in-breeding, it is because weakness already exists and is merely increased by the process, while strong qualities are just as surely perpetuated and increased. The Jews have not developed mental weakness, though history shows no other such instance of human in-breeding carried on for thousands of years.

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(6) *The offspring of parents of pure blood sometimes show characteristics of the remote ancestors of the breed;* this is known as *atavism or reversion*. For example, pigeons, like the original blue-rock pigeons from which all are descended, are occasionally found among the offspring of fancy breeds that ordinarily breed true. Reversion is more likely to occur when distinct breeds are crossed. For example, mules, which result from crossing the horse and the ass, often have stripes similar to those of their zebra-like common ancestor.

(7) *Not all hereditary qualities are apparent at birth.* There is good reason to believe that they appear at various stages of development, as do instincts, especially at the time of puberty. Physical features, and mental and moral qualities of father or mother hitherto unnoticed, often become conspicuous at this time. It is also claimed that inherited bodily or mental disease frequently appears at about the same age in certain families.

GENERAL THEORY OF HEREDITY

The germ cells that unite to form the embryo of a man are of almost microscopic minuteness. The embryo can at first scarcely be distinguished from the embryo of a rat or an elephant, yet it has potentially all the characteristics of the species man. Moreover, it has the peculiarities of the race, nation, and family of each of the two parents from whom the germ cells came. How such minute portions of matter can embody all the characteristics of their ancestors and impose these characteristics upon all the nutriment by which their size is increased many million fold, is one of

the greatest marvels of nature and life. Anything that will make this marvel definitely conceivable is therefore to be welcomed.

If we accept the results of recent experiments showing the exceeding smallness of particles of matter, we may think of each characteristic of each tissue (such as bony or nervous) and of each organ as represented by different kinds of particles of matter in the germ cells. It is thus possible to conceive of the way in which the characteristics of the parents may be transmitted to their descendants. This gives a very crude theory, however, which is not supported by observation and experiment. If every tissue and organ must contribute material to the germ cell, we should expect that the child of a man who had lost a leg or an arm would lack the same member, but such is not the case. Again, if the different parts of an embryo are formed of different kinds of particles, we should expect that if an embryo were divided that a complete organism could not develop from one of the parts. It has been found, however, by experiments upon frogs and other of the lower animals, that the fourth of the embryo (for example, of a frog) will, under favorable conditions, develop into a whole animal with no part missing.

Slight changes in conditions, such as turning an embryo over, putting it in a new medium, subjecting it to a different temperature, or supplying it with food differing in kind or amount from the normal, greatly modify its development. For example, queen bees are the result of rich feeding, and experiment shows that as high as 90 per cent of frogs' eggs may develop into females if the embryos are richly fed. It is, there-

fore, improbable that the characteristics of each animal and each organ are determined by fundamentally different elementary particles of which the germ cells are composed. It is more reasonable to suppose that there are comparatively few varieties of particles, and that these tend to combine in certain ways for each species, according to preëstablished affinities, attractions, and repulsions that are modified in a greater or less degree by external surroundings of the embryo, and by the relative vigor of the different elements of the two germ cells composing it.

The chief discussions in biology during the last decade have centred about the possibility of modifying germ cells through modifications of body cells. Changes in food, exercise, and mode of life may make great changes in an animal or person; but whether such changes modify the germ cells also, so that descendants will have the new characteristics, is a disputed point. For example, if a son is born to a man at twenty-five, and after the father has spent twenty years in practice to develop his musical talents, another son is born, will the last son inherit any more musical ability than the first one? Weismann, who has been the leader on one side of this controversy, says that no changes that take place in the life of a parent can modify the germ cells so as to affect the offspring. Each parent transmits to his offspring what he inherits, but not what he acquires. If this be true, culture cannot be directly transmitted; each new generation must begin where the old began, and if it advances beyond the former, it must be because of better advantages for learning rather than because of inherited ability. According

to this view, acquired weakness of body or mind are also non-transmissible.

In the biological world, progress is possible according to this theory because no two individual descendants are exactly alike, and because the members of each new generation that are best suited to survive under certain constant conditions, are the ones that live and produce offspring, while the others die or produce few offspring. This process being repeated generation after generation, all offspring finally come to have the favorable characteristics in a marked degree. For example, of a dozen young partridges, the ones that are colored most nearly like their surroundings are likely to survive and produce descendants with similar coloring. Again, the most favorably colored of these survive and produce, and thus after many generations the principle of natural selection results in complete color adaptation to surroundings. When a breeder of fancy pigeons continues to breed only those having certain coloring, the results are similar, only in this case it is human instead of natural selection that determines the type of pigeon that shall survive.

Instincts and *intelligence* are modified in a similar way. For instance, only those young partridges that have in the greatest degree the tendency to remain quiet when danger threatens, are likely to reach maturity and produce offspring. Natural selection, therefore, has thus determined the instinct as well as the coloring of the partridge. In the case of *intelligence*, the results are much the same. Plasticity or ability to learn is unquestionably favorable to survival; hence the young animals that learn most readily are likely to survive and produce descendants, some of which have the capacity in a

greater degree. These in turn survive, and thus may natural selection alone account for the development of intelligence in the higher animals and in man. To them ability to learn in infancy is more advantageous than to know unchangeably many favorable modes of reaction. Thus ability to learn which is the essence of intelligence is developed.

This question of inheritance of acquired characteristics is not yet settled in biology, but it is now generally admitted that the characteristics that a parent transmits are chiefly those that he inherited, and that the characteristics acquired by the parent rarely, if ever, so affect the germ cells as to be transmitted to his descendants. In the case of human beings if there is any transmission of acquired characteristics by germ inheritance, it is probably in so slight a degree as to have no effect worthy of note, unless it be where many generations have made the same acquisitions. Progress in civilization is therefore not to be looked for in greater inherited skill or intelligence.

SOCIAL HEREDITY

The acceptance in whole, or even in part, of Weismann's theory of heredity seems at first to make the problem of the improvement of the human race an almost hopeless one, since each generation gets no direct benefit from the improvement of the preceding generation, but must begin just where it did. A closer study, however, shows that the chances for racial improvement are just as good on this theory as on any other. *Capacity* for education, rather than increased knowledge and power at birth, is what human beings need in order

that they may advance ; and natural selection will amply provide for this, especially in these days of rapid change in the conditions and activities of life.

The other factor most needed for racial advancement is a more *favorable environment*—greater intellectual and social treasures—which may be appropriated by the new generations without the toilsome digging required by their predecessors. Each new generation inherits, not only the wealth and knowledge, but all the means of wealth and knowledge, such as machinery, industrial and commercial organizations, educational and scientific institutions, systems and methods, together with more or less fixed social ideals, customs, and language. Whether a man inherits the minute structural changes produced in his parents' bodies by what they did before his conception, is a matter of little moment compared with his inheritance of capacity and opportunity for using all the accumulated results of the experience of the ages. It is this inherited environment in which he is to grow, and upon which he is to feed, that chiefly determines the amount and direction of his development. All the conditions of life produced by civilization constitute what, in a very general way, may be called "social inheritance." Man is truly "the heir of all the ages," and each generation utilizes what has been produced and learned by the preceding. The social heritage of an individual consists of all the knowledge, beliefs, customs, laws, and language of the nation, community, and family into which he is born.

Much of what has been ascribed to physical heredity is, in reality, due partially or wholly to social

heredity. The history of the Jukes family, in which it is shown that nearly all of more than a thousand descendants of one man were criminals or paupers, proves nothing regarding physical heredity, for the family was for many years almost isolated from society; consequently, the factor of social heredity had the fullest chance to operate. The children of a young couple belonging to this family who moved into another neighborhood, and thus partially got the benefit of a different social inheritance, grew up much as other children of the neighborhood. The records of charitable societies show that about eighty-five per cent of the children of paupers and criminals who are placed in good homes at an early age become good citizens.

Every nation and every family possesses a wealth of beliefs, sentiments, artistic and moral ideals, lore, traditions, and customs which descend to the children by an incontestible law of entail. Truly, in educating a child, we should begin with his grandparents; for he will inevitably get the benefit through social heredity in the form of family customs, habits, and traditions, though probably not through inherited acquisitions.

Exercises for Students

1. Give examples of heredity in both the broader and the narrower meaning of the word.
2. Illustrate each of the laws of heredity.
3. Indicate how such characteristics as those of pointer dogs, trotting horses, homing pigeons, could have developed either with or without the inheritance of acquired characteristics.
4. Imagine a company of people of a civilized country placed on an island without tools or machines of any kind, and think how long it would take them to be able to live as they had been living. Then

imagine a company of children of civilized people left without a language or any social or intellectual knowledge, as well as without the material conveniences of civilization, and think how long it would take them and their descendants to reach the civilization of their parents.

5. Are the peculiarities of half-breeds and others who are without a country or people of their own due chiefly to physical or to social heredity?

6. What is the effect of never being a member of a family, as in the case of children in orphan asylums? Why?

Suggestions for Reading

On the general theory of heredity, see Orr, *Theory of Development and Inheritance*; Brooks, *Heredity*, also *The Foundations of Zoölogy*; Weismann, *The Germ-Plasm*; Romanes, *An Examination of Weismannism*, also *Darwin and After Darwin*, Vol. II.

For facts regarding heredity and environment, consult Ribot, *Heredity*; Nisbet, *Marriage and Heredity*; works on criminals, especially Morrison, *Juvenile Offenders*; Winship or Dugdale on *The Jukes*; Galton, *Hereditary Genius*; Woods, "Mental and Moral Heredity in Royalty," *Pop. Sci. Mo.*, Vol. LXI, pp. 366-378, 449-460, 506-513, Vol. LXII, pp. 76-84, 167-182; Ellis, *Pop. Sci. Mo.*, Vol. LVIII, pp. 595-603; Vol. LVI, pp. 59-67; Oppenheim, *Development of the Child*, chap. iv; and for a good brief discussion of theory and facts, see Eigenmann, *Pop. Sci. Mo.*, Vol. LXI, pp. 32-44.

On heredity and education, see Guyau, *Education and Heredity*; Bradford, *Heredity and Christian Problems*.

On social heredity, see Baldwin, Vol. II, especially pp. 57-64; Allen, *N. W. Mo.*, Vol. IX, pp. 400-405, 436-439; *Ed. Rev.*, Vol. XVIII, pp. 344-352; Monro, *Ed. Rev.*, Vol. XVI, pp. 367-377. See also Wilson, *The Cell in Development and Inheritance*; Marwedil, *Conscious Motherhood*.

CHAPTER XVI

INDIVIDUALITY

SIGNIFICANCE OF THE TERM

WHATEVER has a separate existence so that it cannot be divided or fused with something else, without losing its essential unity, has individuality. A pebble, therefore, has some individuality, while a drop of water has none. Again, in order to have individuality, an object must not only have a unitary and separate existence, but it must differ from every other unit. Coins, as they roll from the mint, have no individuality, for each is exactly like the other. The products of machines generally lack individuality, while hand-made goods and the products of organic nature all possess some individuality. No two leaves are ever found exactly alike.

Difference from other similar units may be taken as the essential element in individuality. The difference may be slight or great, and in one or many characteristics. The more characteristics a thing possesses, the greater are the chances for difference or individuality. A mere point can differ from another point in position only, while a line may differ from other lines in position, direction, and length, and a rectangle from other rectangles in position, length, breadth, and proportion of length to breadth. If the rectangle is a material object, it may also differ from other rectangular objects, in

composition, weight, thickness, color, and smoothness. Organic objects may differ in all these ways and also in origin, manner of growth, length of life, etc. It follows, therefore, that the most complex things may be most unlike; hence man, the most complex of animals, has the greatest individuality of all. This is true of the body, and with still more truth may we say, "every human soul is unique."

Although a description of the peculiarities of an individual, as compared with the corresponding qualities in others, is the easiest way of showing his individuality, it is in a way superficial. Individuality depends more upon harmony and unity of qualities or their lack than it does upon the degree in which each quality is possessed as compared with the average person. The permanency of the particular *organization* of qualities is also another measure of individuality.


BIOLOGICAL VALUE OF INDIVIDUALITY

Biologically, the significance of individuality is as great as that of heredity. If every individual of a new generation were exactly like its parents, evolution would be impossible. An almost infinite variety of individuals must be produced in order that the fundamental principle of evolution, *i.e.* natural selection, may act effectively. Probably not one acorn in a thousand sprouts and takes root, and not more than one in a hundred of those that do, ever reach the proportions of a full-sized oak. The loss of buds and branches in each individual oak is almost equally great. In the animal world the loss is scarcely less, especially in the lower forms of animal life. If all grasshoppers' eggs matured, the

globe would be buried with them in a few years. Which of these vast multitudes of young creatures of each species shall survive, seems entirely a matter of chance, or, in other words, of temporary and local conditions ; but such is not the case. No two organisms, from the tiniest leaf, or seed, and the smallest bug to the most complex of all beings, — man, are exactly alike. Despite their similarity every member of each species has some individuality. Those having characteristics in the slightest degree more suitable to the constant conditions of life, are most likely to be preserved to produce others with some of the same characteristics.

The enormous loss of life in each new generation is therefore not wholly useless, for those animals that survive have the characteristics that fit them to live successfully in the environment into which they were born, while those that perished were less favorably endowed. The continued existence of the species so long as conditions remain the same, is thus assured. If conditions change, some individuals are likely to survive and produce descendants, whereas, if all were alike, all would perish. The selection, for survival, of those best suited to the new conditions, results in further evolution of the species and its more complete adaptation to the new life conditions.

To the human race, individuality is even more important, for not only does it favor physical evolution, but also social progress. If there were no persons differing from the common mass of mankind, to serve as leaders and models for imitation, changes in customs and modes of thinking would be impossible. Progress would come to an eternal standstill.



COMMONALITY AND INDIVIDUALITY

Every person, as Shylock eloquently shows, has the essential characteristics of a common humanity as well as individual peculiarities. Physically, all have body, limbs, head, and internal organs; but the absolute and relative size of each are never the same in two individuals.

In height, men vary from three feet to eight feet, and in weight, from fifty to five hundred pounds. The average child at birth weighs about seven pounds, but an individual child may weigh anywhere from three to sixteen pounds. Although seventy per cent of the children in a first grade may be comfortable seated in the average seat for that grade, some individuals will require much smaller seats, and others, seats as large as are usually required in a sixth-grade room. The average pulse beat of men is seventy, but it may be forty or over a hundred. Differences equally great are found in every organ and process, and in the relation of parts and processes to each other, *e.g.* a man six feet high may have a shorter body than one only five and a half feet in height. Indeed, it is difference in proportion of parts rather than in absolute size that enables us to distinguish one individual from another.

Even the very elements of which bone and muscle are composed differ in different persons; hence the combination of these elements into organs of different sizes must give rise to still greater differences in physiological processes, temperaments, movements, sensations, thoughts, emotions and actions.

Shoe dealers, doctors, teachers, and preachers would

find their tasks much simplified (though rather dull and mechanical) if there were complete uniformity. Society would be quite democratic. There would be no idiots and no geniuses, no criminals and no philanthropists, no radicals and no conservatives. Methods of work and modes of worship would soon alike be mechanically regulated and continued without change.

On the other hand, in a country where there is great individuality and no uniformity, governments exist only by force. Common processes, standards, and laws are impossible; there is no peace except that of tyranny and subjection, and no permanency beyond the life of the dominant individual. A certain amount of uniformity is therefore necessary to the stability and peace of the social organism, while individuality is equally necessary if it is to be progressive.

Looking at the matter simply from the standpoint of individual happiness, the person who is like his fellows in nearly all respects is in harmony with his social environment, and so far as that is concerned, is at least negatively happy. The person who differs greatly from his fellows in knowledge, temperament, habits, and ideals is shut off from any real companionship, because there are none of his kind with whom to associate. He is irritated by their monotonous lives, and they, by his eccentricities; hence the man of genius is often miserable. The person who differs from his fellows by inferiority is even more unfortunate if he realizes it. Perhaps there is least comfort for the man who is neither superior nor inferior, but simply different. To be happy, a man must have much in common with his fellows; and to be useful, he must have also something

that they have not. It follows, therefore, that not only does the stability and improvement of the social organism depend upon the presence of both common characteristics and individual peculiarities, but so also does the welfare and happiness of the individuals composing the social organism.

FACTORS PRODUCING COMMONALITY AND INDIVIDUALITY

Heredity favors uniformity in proportion to the oldness and pureness of the ancestral line, while mixed parentage results in greater differences in the offspring. In no case, however, are all the children of the same parents exactly alike, even at birth. How far these differences are due to germ heredity, and how far to prenatal influences, we do not know; but the fact remains that every person has in some degree native or congenital individuality.

Experience, training, and teaching, in so far as they are uniform, favor commonality. Where there is the same climate, industries, customs, laws, religion, and knowledge distributed through the schools and the press, the people will inevitably be of a single type.

Though there are *natural* and *social influences* tending to produce commonality, yet a greater or less degree of individuality is found in every home, community, and nation because (1) congenital differences cause the individuals to react in various ways to the common external influences, (2) differences in treatment result from these congenital peculiarities (*e.g.* a bright child is asked to do things a dull one is not, and a quarrelsome child is treated differently from an even-tempered one by his companions), and (3) chance influences (such as being

the youngest or oldest in the family, and special accidents or events that affect one child and not another, or that occur at a different stage of development) give a different form to each character. Slight differences may produce, ultimately, enormous individual variations. The truth: "To him that hath shall be given," is of the widest possible application, and thus all congenital individuality may be increased by external influences.

TIME OF GREATEST INDIVIDUALITY

It is hard to say at what age individuality is greatest. In adults there is much more of the harmony and unity of characteristics that make an individual a person, instead of a mass of partly related phenomena, than in the case of an infant. The individuality is also more fixed, so that it is less modifiable by surroundings. In children, individuality is less because the child's nature is simpler and many of his peculiarities are transient. On the other hand, the child's individuality is greater in some ways because he has not been subjected to the many years of social training and education that have tended to make adults all alike. The new instincts that develop as the years pass, increase the possibility of individual differences in a way that partially balances the influences tending to uniformity.

Measurements and tests show greater individual differences for young children, and for those just entering their teens, than for other ages. This is largely accounted for by the fact that rapid changes are occurring at these ages, and by the fact that such changes begin earlier in some children than in others. About three

times as many children are of the mean weight at eight years of age as at fifteen ; while the difference in weight between the largest and the smallest boy at fifteen is about twice as great as between the largest and smallest boy at eight. The changes being slow for several years before and after eight years, a difference of a year or two in the time of entering upon a new stage of development makes only slight individual difference in children of that age, while at about fifteen the changes are so great that the difference between one who is a year late and one who is a year early in his development is very marked.

Physiological studies show also that adolescents differ greatly from each other in thought, feeling, and action ; and history testifies that many inventions and innovations have been made by adolescents. We therefore conclude that, everything considered, individuality is greatest during the adolescent period. Some persons who resist common influences, and continue to develop their own peculiarities, show the greatest individuality in maturity or old age ; but the majority become more and more like their fellows in general society, and like their co-workers in their occupation.

GENERAL AND PARTICULAR TRUTHS REGARDING CHILDREN

The anatomist, physiologist, psychologist, and moralist make many generalizations as to what is true of the average man ; but no individual will be found who is in all particulars an average man. The generalizations are not false or useless, but eminently true and valuable, since they give a mean or standard to which the great

majority of men approximately conform. Where there is one man between seven and eight feet high, there are hundreds of thousands between five and six feet. It is thus practical to construct doors, chairs, and beds to suit the majority of men. The variations in proportion of parts are greater, yet the majority of men can be fairly well fitted with ready-made clothing. A perfect fit, however, requires individual measurement, and in a few cases such measurement is necessary in order for the clothes to be worn at all.

Standards regarding physical processes are of great value in medicine as indices of physical health; yet physicians find it necessary to determine the normal standards of individuals in order to properly diagnose and prescribe successfully.

Generalizations regarding the mental power and the moral worth of the average man are of immense value in practical and social life, yet individuality must be recognized in explaining or appealing to men, to a greater extent than in manufacturing furniture and clothing, or in prescribing food, medicine, and exercise.

Scientific students of children are trying to make generalizations in the realms of anatomy, physiology, psychology, and morals as to the characteristics most prominent at different ages. Such generalizations, when carefully made, are valuable as standards of comparison. They are not, however, models to which individuals should be made to conform, any more than men should be made over to fit coats, chairs, or the size of pills. On the contrary, the results of child-study investigations have always emphasized the greatness of individual difference in children and the need of recognizing it. For

example, though carefully prepared tables show that the average boy of eight is forty-seven inches high, yet individuals of that age are found fifty-five inches in height, which is equal to that of the average twelve-year-old, and others, only thirty-five inches, or less than the height of the average three-year-old.

After the sixth year, the fifteenth year is for the average boy the year of most rapid growth; but individual boys begin to grow more rapidly as early as the twelfth year, and others as late as the nineteenth. Again, the average boy grows about three inches in his fifteenth year; but individuals have been known to grow thirteen inches in that year. Tests of rate of movement, strength, endurance, sensitiveness, discrimination, and memory show increase during school age of from two to five fold; yet nearly as great differences are found between the poorest and the best individuals of each age. In nearly all tests of children of different school grades, even where the change with grade is marked and fairly regular, one usually finds nearly as wide a divergence between children in the same grade as between the averages for the lowest and the highest grades.

Children usually learn to walk when a little over a year old, but some begin as early as seven months, and others not until nearly two years of age. At two years, most children use three or four hundred words; but some do not use a dozen, and others, more than a thousand. Most children show marked changes soon after entering the teens; but some show none, and others go through such changes long before or long after that time. Children who do well in their school work (according to Porter and Hastings) average larger than

judgment in making each garment a work of art. In a similar way, we may say that children may be taught more successfully in the mass, according to general principles under the supervision of an expert, than they can be taught individually by a poor teacher who has little knowledge of general principles of education, and less ability in reading individual children, and no skill in dealing with them. The best results can be reached, however, only when the teacher is an artist and able to fit the work to individual needs, so that every child may be moulded according to the same general type as other children, and developed so as to bring out the highest and best of his individual characteristics.

HOW COMMONALITY AND INDIVIDUALITY MAY BE DEVELOPED

To develop the common characteristics necessary to the maintenance of proper social relations, there must be some uniformity as to what is done and learned. All must at least learn a common language, and some of the fundamental customs of the nation. Many other things in our present course of study are more or less necessary and desirable, but none are so essential as means of communication and common traditions. A certain amount of knowledge of arithmetic, geography, etc., is also desirable as a common basis of understanding.

To preserve individuality, the requirements in all the subjects of a course of study should be set at rather a low minimum, with no maximum and no time limit. In other words, every child may be required to reach a certain minimum of knowledge and skill in funda-

mentals, but not in any stated time. To promote individuality, he must be allowed and encouraged to go beyond the minimum in any lines he chooses, and given opportunity for becoming interested and for working in any and every possible line of study and activity.

TYPES OF INDIVIDUALITY

Since every one comes in contact with thousands of individuals of varying similarity and difference, it would be very convenient if one could classify them into a few types, and then deal with the individuals according to the types to which they belong. The classification most commonly used has been that of temperaments, but unfortunately (or perhaps fortunately) few individuals exhibit exactly the characteristics ascribed to any one of the several temperaments. Some of the characteristics of several temperaments are shown by one individual, and none of them in the same degree by any two. In many cases the best method of treatment may be more readily and accurately determined by studying the individual than by classifying him as belonging to a certain type.

The varieties of individuality are so great that psychology and child study can never tell teachers what they would most like to know — just how to deal with individual pupils. Science in its very nature is general; its goal is the discovery and statement of general rather than individual truths. Scientific knowledge is not, however, useless to the teacher; the more she knows of how most human beings act and develop, and of the characteristics most common at each stage of develop-

ment, the more quickly and correctly will she be able to determine what is the best treatment for an individual child. Experience in dealing with other children more or less similar, will also be helpful in determining what to do with the child in question. The reading of how other children have been dealt with and the study of biographies and of novels that are true to life, may in part take the place of actual experience with children. From such experience and study one may form in his own mind a more practical classification of children than he can by trying to understand the types described by another.

Children are usually best described and managed according to prominent characteristics, rather than according to groups of qualities indicated by type names. It is much more important to the teacher to know whether a boy is slow or quick in his mental operations, than it is to know whether he has all the characteristics of the phlegmatic or of the nervous temperament. The accuracy and ease with which a pupil works, depends, more than anything else, upon the rate at which he is required to perform each operation. Often a pupil can work best and most easily at twice the rate that is best suited to his classmate. On the other hand, the slow pupil may be able to maintain a steady, prolonged activity under direction, for a length of time utterly impossible to the pupil with the more agile mind. Experiments by Davis indicate that persons who are quick in their reactions gain more in muscular power by light than by heavy practice, while those who are slow gain most by heavy practice. Experiments on fatigue also indicate that quick persons show more rapid and sud-

den variations in fatigue than those who are slow. Observation also indicates that slow individuals often improve under stimulus and direction, while the quicker pupil may be so excited and disturbed by stimulation and close supervision that he makes many mistakes and wastes much energy.

Of course there are large numbers of children who are neither especially quick nor slow, and who are therefore most helped by an intermediate mode of treatment. The final test of the suitability of any method of treatment for a child is the effect which it is observed to have upon him; hence no study of generalizations and types of individuality can ever render unnecessary the observation of individuals.

Exercises for Students

1. State some examples of individuality that you have observed in plants or animals.
 2. If plants of the same variety were all alike, would it be possible to improve the variety? Why?
 3. Give not less than six examples of *extreme* variation of some kind in people. Are any of these persons treated differently because of their peculiarity?
 4. Discuss the advantages and disadvantages of uniformity and individuality in ability, beliefs, and customs in a community, so far as they may be produced by education and law.
 5. Give illustrations of persons who were miserable because of their difference from other persons, of those who were useless for lack of it, and of those interesting or influential because of it. Do leaders have much, little, or a medium individuality?
 6. Give illustrations of individuality due to heredity, to acceleration or retardation in development, to surroundings, to chance circumstances, to hereditary peculiarity. Is it of any value to the teacher to know the causes of individuality? Why?
- Have the people of the United States more or less individuality than those of other nations? Why? Mention the various

factors tending to make them have more or less individuality than the people of England.

7. As regards permanency or degree of individuality, what would the following be: a radical? a conservative? a man set in his way? a genius? an imbecile? a saint? a criminal? an athlete? an invalid? a giant? a dwarf?

8. Do the following promote individuality or commonality: churches? lodges? public lectures? theatres? factories? shops of the Roycroft type? Name other things that produce uniformity or individuality.

9. In what respects is the individuality of a successful reformer like that of a crank or a martyr, and in what respects different?

10. At what age did you feel yourself most different from other people? If one goes into new social surroundings, is he likely to feel his individuality more or less? Why?

11. Give illustrations showing the value of knowledge of certain general truths regarding the characteristics of children of each age and grade, and also of the value of knowledge of individual peculiarities. Which do you think is of more advantage to a teacher, to know many general truths regarding children, or to be able to readily note and understand individual peculiarities?

12. If a class of children are to be prepared for the same examination, why should individuality be recognized? Illustrate.

13. In preparing a lesson, should a teacher think more of the common characteristics of a class or of their individual peculiarities? During the lesson which should she think more of? How can she best meet both class and individual needs?

14. What is the general effect upon individuality of allowing children to choose for themselves a good deal? Illustrate.

15. Describe some of the ways in which you have known individuality to be recognized and promoted in school.

Suggestions for Reading

On the nature and importance of individuality, see Bailey, *Psych. Rev.*, Vol. VI, pp. 649-651; Ch. S. Mo., Vol. I, pp. 649-651; N. W. Mo., Vol. VIII, pp. 250-256, 370-375; Stanley, *Ed. Rev.*, Vol. XVIII, pp. 80-84; Howerth, Jr. *Ped.*, Vol. XIV, pp. 311-

- 324; Doan, *Jr. Ped.*, Vol. XIV, pp. 13-33; Ribot, *Psychology of the Emotions*, pp. 380-404.
- On tests and types of individuality, Wissler, Monograph Suppl. to *Psych. Rev.*, No. 16, pp. 1-62; *Jr. Ped.*, Vol. XIV, pp. 203-213; Sharp, *Am. Jr. Psych.*, Vol. X, pp. 328-391; Kirkpatrick, *Psych. Rev.*, Vol. VII, pp. 274-280; Kelley, *Psych. Rev.*, Vol. VII, pp. 345-372; Bagley, *Am. Jr. Psych.*, Vol. XII, pp. 193-205; Bohannon, *Ped. Sem.*, Vol. IV, pp. 3-60, Vol. V, pp. 475-496; F. Burk, *N. W. Mo.*, Vol. VIII, pp. 481-484; Baldwin, *Ch. S. Mo.*, Vol. I, pp. 121-124; Beebe, *Ch. S. Mo.*, Vol. III, pp. 14-25; Burnham, *Ped. Sem.*, Vol. II, pp. 204-225; Davis, *Yale Studies*, Vol. VIII, pp. 64-108; Ladd, *Physiol. Psych.*, chap. xi.
- For studies of individuals, Stableton, *Diary of a Western Schoolmaster*, or a series of articles in *N. W. Mo.*, Vol. VIII; Carmin, *Ped. Sem.*, Vol. IX, pp. 106-117; Galton, "History of Twins," in *Human Faculty*, or as reprinted in *Teachers College Record*, May, 1901, or a number of sketches of individual children in *Ch. S. Mo.*, together with such works as Smith's *Evolution of Dodd*.
- On individual teaching, see Search, *An Ideal School*, chap. viii; *N. E. A.*, 1895, pp. 398-406; *Ed. Rev.*, Vol. VII, pp. 154-170; Kennedy, *Jr. Ped.*, Vol. XIV, pp. 130-139; Greenwood, *Principles of Education practically Applied*, pp. 173-192.



CHAPTER XVII

ABNORMALITIES

ABNORMALITY may be regarded as that form of individuality which is in some degree destructive. No peculiarity, however marked, is, properly speaking, an abnormality, unless it interferes either temporarily or permanently with physical or mental functions. We shall consider here only those abnormal conditions and defects which are of most significance to parents and teachers.

FATIGUE: NATURE AND CAUSES

Every one knows what it is to feel tired, either all over or in certain portions of the body, and in common language this feeling of weariness is often called fatigue. The scientist, however, pays little attention to the *feeling* of weariness in investigating the subject. In studying fatigue in another person, in animals, or in a single muscle, there is no means of observing the feeling of weariness. We can, however, observe the action of the muscle, animal, or person, and note changes in the action after it has continued for some time. The decrease in power to do indicated by change in amount, rate, or accuracy, which can be observed and measured, is what is meant by fatigue. Hence fatigue is a condition of decreased power produced by continued activity.

Not only is it more practicable to study fatigue in the scientific than in the common meaning of the word, but the feeling of weariness, and fatigue, in the scientific meaning of the word, do not necessarily correspond. A person may feel tired before his power to do shows any decrease, and, on the other hand, an individual often does not feel weary after his power to act has been very much decreased.

Physiologically, fatigue may be of (*a*) muscles, (*b*) nerve centres, or (*c*) sense organs, but probably never of nerve fibres. Lombard's experiments show that when a finger is so fatigued that it cannot be moved voluntarily, the muscles may be caused to contract by electrical stimulation. This indicates that the nerve centres controlling muscles may be completely fatigued, while the muscles themselves are not. In nearly all action, there is diffusion of impulses to muscles and nerve centres not directly concerned in the act being performed. Especially is this the case when considerable effort is being made; hence parts concerned in these associated acts may also become fatigued. The feeling of weariness following acts of attention is probably often due largely to the fatigue of the eye, and other muscles that are unconsciously kept contracted.

The loss of power when fatigued is probably due to three causes: (1) deficiency of oxygen necessary to chemical activity in the working parts; (2) the clogging and perhaps poisonous effects of waste material thrown into circulation by the parts that are active, and (3) decrease of nervous and muscular energy stored up in the parts. The change that takes place in the chemical reaction of an active muscle, in the size of an active

nerve cell, and in the amount of waste material thrown off by the organism when it becomes active, leaves little room to doubt that there is a direct relation between activity and chemical changes. The energy used in physiological activity comes from the breaking up of complex compounds as action proceeds, and recovery from fatigue is the result of the carrying away of waste and poisonous material, and the building up of fresh complex compounds. While action is in progress it is doubtful whether there is any building up of fresh material, but there is probably continual use of the oxygen carried by the blood, in the chemical action that is taking place. The feeling of weariness and temporary fatigue are probably caused principally by the decrease of oxygen in the blood, and by the clogging and poisonous effects of waste material. This is evidenced by the fact that a dog, into whose veins the blood of a fatigued dog was injected, showed all the signs of weariness. Fatigue that requires a long interval of rest is probably largely due to the loss of energy which must then be renewed by building up new compounds.

It is probable, also, that the molecules in most favorable condition for being broken down are used up in slight fatigue, while others do not readily give out their energy until an extra stimulus is received, or the waste material removed. This is perhaps the reason why one who receives a fresh or stronger stimulus may seem to suddenly recover from fatigue, and work more vigorously than before. Thus the news that the enemy is coming seems to give the weary, marching soldiers fresh energy, and the promise of a day's fishing stimulates the

lagging boy to hoe quickly his row of corn. It is probable, therefore, as Thorndike claims, that many experiments upon fatigue have tested inclination to do, rather than actual power. It should be remembered, however, that inclination has a physical basis.

LAWS OF FATIGUE

The laws of fatigue, revealed by many and prolonged investigations recently made upon both physical and mental activities, are found to be very complex.

(1) Soon after activity begins, not fatigue, but its opposite is shown in what is called in common language "*warming up* to the work." The rate and accuracy are greater after a short period of activity than at the beginning, and this is true in acts so perfectly learned that there is no improvement through practice. The cause of this is, in part at least, the increased flow of blood that always goes to an active part. It may be also that after chemical action is once set up in a centre, it proceeds more rapidly than at first, just as a fire burns better after it is started.

(2) *Fatigue may be either general or local.* Local fatigue may be confined to a single muscle or to the nerve centre controlling it, to a single sense organ or its centre, or even to one or two peripheral elements of a sense organ, as a single spot on the skin, a few retinal elements of the eye, or to the elements concerned in the perception of certain odors, tastes, or colors.

(3) *Extreme general fatigue produces local fatigue of all parts*, but apparently not in equal degrees, and *extreme local fatigue affects other and finally all parts*, the order probably depending upon diffusion of im-



pulses, especially in lines of associated action. Anything that lowers general vitality, as fasting, loss of sleep, depressing weather, or sickness, produces a condition similar to general fatigue.


(4) There are some facts favoring the idea that *the energy stored up in one part may be transferred to other parts in case of need*. There is undoubtedly indirect transference of energy in cases where starving men or animals "live on their own fat" for days, and not only live, but expend energy in actions of all kinds. In such cases the nutriment is probably absorbed by the blood and supplied to the parts most needing it. In the phenomena of rhythmical recovery or "second breath," discussed below, the increase of energy, however, is so sudden that it seems hardly likely that the blood is the medium of transference (though perhaps not impossible, for recovery from fatigue after fasting begins almost as soon as food is taken, and is nearly complete, if the fast has not been extreme, in half an hour), hence it is thought that nervous energy may pass from surrounding centres to a fatigued centre, in the same way that impulses spread from one active centre to other centres.

(5) *Fatigue usually increases and then decreases rhythmically*. It has long been a matter of common observation among those who work or play vigorously for a long time, that after becoming very tired so that they are almost unable to do anything, continued effort frequently results in a rather sudden return of power, so that they are soon almost, if not quite, as fresh as at the beginning. Laboratory investigations of this phenomenon, known as "second breath," have been recently made, and the results of common observation confirmed

and made more exact. Lombard found that if he continued to try to contract his finger after it had become so fatigued that he could not move it, he soon regained the power almost completely, and that it was possible to recover, after producing complete fatigue, again and again, though not so perfectly as at first. By alternating electrical stimulation with voluntary contraction, it was found that the periods of exhaustion and recovery occurred in both nerve centre and in muscle, but not at the same time. In some persons, complete exhaustion and recovery cannot be produced, while in nearly all cases continued effort results in variations indicating partial renewal of energy or recovery from fatigue.

This phenomenon of sudden recovery after exhaustion may be partially explained, where it is local fatigue only, by the fact, easily observable, that as one makes great effort to do a thing, there is a wider diffusion of impulses in the act. In extreme fatigue of a muscle and its centre, it is probable that a large part of the energy is diffused to other parts, and possibly for a while these only are active, thus drawing the blood away and giving the exhausted portion time for the waste material to be removed, and a sufficient amount of oxygen brought in, to again set up active chemical action with liberation of energy. The other explanation now being received favorably by many is, that nervous energy suddenly flows in from surrounding centres as suggested in (4).

(6) *There seems to be something in the nature of a constant daily rhythm of available energy.* Various experiments show that not only does bodily vigor vary with health and the amount of bodily or mental activity just undergone, but that it varies at different times of



the day, commonly being greatest in the morning just after breakfast, and decreasing during the day, with the exception of slight rises just after food has been taken at noon and at night. That the daily rhythm is not entirely the result of rest during the night, and of gradual, general fatigue during the day, is indicated by the fact that it is fairly constant and characteristic for each individual, but quite different for different persons, a few being at their best in the afternoon, and a good many in the evening. Since more deaths occur at about four in the morning than at any other hour, vitality is then probably lowest, owing partly to cosmic processes. There is good reason to believe, however, that the daily rhythm in power depends to a considerable extent upon previous habits of working and resting.

(7) *Extreme fatigue leads to exhaustion and loss of the sense of weariness.* Marked variations from the usual daily rhythm, such as being at the best in the afternoon or late at night, are occasionally found in vigorous persons, but are sometimes evidence of extreme fatigue or exhaustion. This is usually the case if the individual feels tired in the morning. It seems that nature by the feeling of weariness gives warning of fatigue soon after it begins; but that later, as activity continues, and perhaps as the resistance to the giving up of nervous energy ceases, and the blood vessels of the active parts lose their elasticity from continued enlargement, the *feeling* of weariness disappears, and the work can be done without discomfort or great effort. After a period of rest there is just enough recovery from exhaustion to put one into a condition of more normal fatigue, which is felt as weariness and languor in the morning,

but disappears with the activity of the day as fatigue increases. This kind of fatigue is excessive, for it depends upon an irritable condition of the centres, which causes them to give up readily their scanty supply of energy. If activity under these conditions is long continued, the centres often lose their power to absorb nutriment from the blood, and there is a continual tearing down without any building up; though the tearing down is perhaps shown in the illusive form of ability to work mentally without sleep or rest, and without any feeling of weariness. This is the condition usually known as "nervous exhaustion," and a long time is required for recovery from it.

(8) *Moderate and regular activity produces less fatigue for the amount of work done than spasmodic and excessive effort.* It is possible to lift a weight again and again at such infrequent intervals that no fatigue will appear, owing to the fact that the energy is renewed before the weight is again lifted. On the other hand, if it is lifted again and again at very short intervals, fatigue appears very soon; and if it is lifted and held suspended, fatigue appears still more quickly, because there is no chance for renewal of energy. If a moderate weight is lifted a number of times at a moderate rate, then a sufficient period of rest taken, more work can be accomplished with less fatigue than in any other way. Doubling the weight or the rate, or prolonging it unduly, more than doubles the difficulty of the task. What is true of lifting weights is true of all forms of physical and mental activity. Too rapid or too prolonged expenditure of energy not only gives no chance for accumulation of energy, but results in much waste in useless

activity and effort. When fatigue is extreme, a long time is required for recovery; hence one who works when fatigued, *always and inevitably wastes both energy and time*, to say nothing of the effect on health.

(9) *Fatigue varies with age.* Compared with adults of middle age, all children fatigue quickly and recover quickly. In general, the younger the child, the more quickly he fatigues, especially as regards local fatigue, and recovery is equally rapid when some other part is called into action. According to good authorities, children of school age cannot be expected to do one thing without rest or change for more than ten minutes, in the lowest grade, gradually increasing to forty or fifty minutes in the higher grades. Friedrich found that recesses always improved the power of school children, and that two recesses in a three-hour session produced more improvement for the latter part of the session than one.

(10) *The variations in fatigue phenomena for individuals of the same age are very great.* Some fatigue quickly and recover quickly, others fatigue slowly and recover slowly; while those highly favored by nature fatigue slowly and recover quickly, and some unfortunates fatigue quickly and recover slowly. There is a certain rate and intensity of working, and a certain relation of work and rest periods during the day and the year, and of the amount of one kind of activity as compared with another, that would most effectually economize the energy and health of each individual. Every adult who wishes to accomplish as much as possible should, with far more care than he plans his expenditure of money, determine what are, for him, the most

economical ways of expending energy. A programme for a school should be adapted to the largest number possible, then, if necessary, some individuals should be allowed special programmes.

(11) The effects of *different kinds of activity* and of *change* of activity upon *general* and *local* fatigue are great, but not well known, because the results of experiments differ. The problem is much the same as that of general and special training, because it depends upon the effects of activity of one part upon that of other parts connected with it. Some investigators find muscular strength, as indicated by the amount gripped with the hand, increased after mental exertion and others decreased, and the same of mental activity after muscular exertion. One of the causes of these differences is probably a difference in degree of fatigue. Just enough activity to get "well warmed up" naturally has upon other activities an effect just the opposite of fatigue almost to exhaustion. The change in circulation involved in change of activity may also be slow or quick in taking place, and hence the results may be either favorable or unfavorable at once, or after a short interval. Again, if activities are so related that one is involved in or connected with the other, a change from one to the other will not be favorable either to good work or to recovery from fatigue. The fact, therefore, that some have found the mental power of school children decreased after a period of gymnastics, does not prove that an interval of gymnastics *must* decrease the power of children to do mental work afterward, but merely that it *may* do so. If it is excessive, or if it is of such a nature that close attention and exact movement

are required, it is almost sure to do so ; but if it is slight and so free as to require little or no attention, and the air breathed during the exercise is good, the respite from mental activity and the quickening of the circulation, increase of oxygen, and the change of blood supply to different parts, can scarcely fail to increase the mental ability of the children during the next period. This, at least, is very certain : children fatigue very quickly unless changes in kind or mode of activity are frequent.

TESTS AND SIGNS OF FATIGUE

Tests that would be of value to the ordinary teacher in determining the adaptability of her daily programme to her children, and in discovering exceptional instances of fatigue in the school or in individual pupils, have been sought for several years. It may be safely said, however, that no method of discovering fatigue, that can be mechanically applied by a teacher, has been found. Such tests cannot take the place of intelligent common sense and good judgment on her part. She must not only be able to note the decrease in rate or accuracy of working, but must also learn to read the signs of oncoming fatigue, in the pupil's attitudes and movements.

The signs that appear first are variation and wandering of attention or increase in effort to attend, or in movements of a fidgety or restless character. The first is an indication of mental fatigue, and the last, of fatigue of muscles that have been contracted during the period of attention. Sometimes the increase of movement, especially when the fatigue is considerable, is the result of increased irritability of the nerve centres, resulting in


continual outflow of energy and many rather nervous responses to sudden auditory and other stimuli.

Other more or less common and significant signs of fatigue and exhaustion that the teacher may observe or learn by inquiry are as follows: jaded expression of face, drooping attitude, paleness or redness of cheeks or tips of ears; dazed, weary, fixed, or lack-lustre appearance of the eyes; sudden movements, grimaces, frowning, compression of lips, twitching of the fingers, face, eyes, or eyelids; unsteadiness as shown in bad handwriting, mispronunciation and miscalling of words in talking and reading; headache, cold feet, sleeplessness, dreaming, teeth grinding, or talking in sleep; irritable, cross, or peevish disposition or moods; poor hearing and imperfect discrimination of words, sometimes with extreme sensitiveness to disturbing sounds; blurring of vision, color blindness, and double images; temporary loss of memory of familiar or recently stated names or facts; and failure of mental grasp, as indicated by inability to follow a chain of reasoning and a tendency to forget what one is going to say.

The test that is of greatest value to a teacher is one that shows the curve of fatigue in different children, because this throws much light on their individuality. One who fatigues very rapidly and recovers with equal suddenness requires quite different treatment from one who fatigues very slowly and gradually.

SOME ABNORMAL BRAIN STATES

The brain is in such intimate connection with all parts of the body, and is influenced so much by every physiological process, that healthy development of




brain and body are closely correlated. Impulses are continually going from the brain to every muscle, organ, and gland, as well as from each part of the body to the brain. Imperfect activity of the brain may, therefore, be shown in paleness of the face, slow growth of the body, and imperfect development of parts, as well as in attitude, and expression of face and movements; while, conversely, a defect or disturbance in any part of the body may affect brain activity unfavorably. It is well, therefore, to notice not only the height and weight of a child for his age, and the color of the skin, but also the signs of imperfect development of organs, such as irregularities in shape of the head, narrow palate, broad bridge of the nose with small openings in nostrils, and imperfectly developed external ear; for, as Dr. Warner has shown, these are often associated with poor nutritive condition and mental dulness.

Even more important are what he calls "*nerve signs*," which indicate the amount of nervous energy being sent to the different muscles of the body, and hence the amount and regularity of the activity in different parts of the brain. Wrinkling of the forehead is always indicative of some brain disturbance, as are also irregular and meaningless movements of any part of the body, while a normal brain condition is shown by good attitude and well-balanced and coördinated movements, because this means that all parts of the brain are functioning vigorously, regularly, and harmoniously. Some of the more important "*nerve signs*" to be observed are: degree of erectness of body and head in standing or sitting; ability to hold hands straight out and evenly, palms down, without throwing the shoulders back and

bending the spine forward; and to keep fingers and thumb straight without allowing them to droop or to bend back too much.

The effects of *poor nutrition* are much the same as of general fatigue, as far as the power to do the work of the school is concerned. The common signs are paleness, fulness under the eyes, fewness or irregularity of spontaneous movements, and lack of steadiness of control, or power of continued application. Poor nutrition may be the result: of lack of sleep; of lack of nutritious food; of indigestion, due to irregular eating of indigestible food; or to a diseased condition otherwise produced. In all such cases the teacher may try to secure a change in home conditions and habits, which will make it possible for the child to do the work and conform to the discipline of the school, or this failing, she may modify the requirements for the child so that he will not be over-fatigued, and his condition made worse rather than better by attendance at school.

Nervousness is a common result of fatigue, either general or local, and of poor nutrition. Even when the nervousness is hereditary, it is always increased by these conditions. Nervousness is a condition of increased irritability of nerve centres, and is shown by excessive movement in response to stimuli, especially sudden sounds, and in lack of steady and perfect control of movement. Restlessness, or a strong tendency to move about a great deal, is sometimes mistaken for nervousness, though one is due to excess of nervous energy and the other to irritability of nerve centres. Either nervousness or restlessness may be produced by trying to keep still in a certain position, or by engaging in fine



work that necessitates holding the larger muscles steady, and moving accurately a group of smaller ones.


The strong, restless child may be benefited greatly, so far as ability to behave and study is concerned, by an interval of vigorous exercise; while the nervous child would be exhausted and quite unfitted for the next work by such vigorous activity. He should have instead mild exercise, or a chance for quiet rest. It is especially important that the nervous child should not be scolded; found fault with, or in any way induced to work hard or worry about his work. A teacher who is loud of voice, unattractive in dress, and sudden and variable in manner is especially irritating to a nervous child, and may be the chief occasion of the nervousness. Although a teacher should be quick to note signs of nervousness, she should avoid making the child conscious of his condition. The establishment of regular habits of work and of rest or amusement are of great value in decreasing nervousness.

Chorea or *St. Vitus's dance* is somewhat allied, in appearance and cause, to nervousness; yet it is a disease rather than a temporary condition. It is not, like nervousness, due to general irritability of the nerve centres as shown by increased response to stimuli, but to a more or less spontaneous and abnormal action of certain nerve centres and muscle groups, which give rise to useless and meaningless movements of certain portions of the body, and produce partial or total inability to perform comparatively simple acts, such as writing, buttoning clothes, touching a point with a finger, walking, or talking. It may be manifested in the mild form of occasional twitching or jerking of one hand, or in the

severer form of jerking and twitching of muscles of one-half or of all the body. In mild cases it may be detected by holding the child's hand between the palms, and noting the twitching, or by observing the movements of the tongue.

It is preëminently a disease of childhood, for 34 per cent of the cases occur between five and ten years of age, and 45 per cent between the ages of ten and fifteen. It is most common in the thirteenth year for girls, who are about twice as liable to it as boys. The largest number of cases occur in the spring, and an attack usually lasts from four to ten weeks. It is frequently associated with rheumatism and heart disease; but its most frequent cause is excitement, especially fright. Bright children are more subject to it than dull ones. Worry, fright, and fatigue make it worse, and often bring on another attack after recovery.

The best remedy for it is as complete rest as possible of mind and body, with nutritious and easily digested food. If possible, the child should be kept in bed day and night for some time, even though he is at first restless. In any case he should not be allowed to continue in school, unless the home conditions are extremely irritating and unfavorable. He is likely to be made worse by the effort to keep up with his class, and his presence in school often affects unfavorably nervous and choreatic children, especially the latter. There is no doubt that chorea may be produced in such children by force of suggestion. When there are children in the school liable to chorea, particular care should be taken to avoid excessive fatigue, excitement, fright, or worry, caused by reproofs or severe examinations.



STUTTERING AND STAMMERING

Stuttering is sometimes very properly classified as a form of chorea, for there is in reality a spasmodic contraction or twitching of some of the muscles concerned in speech. Stammering is want of proper control of the muscles of speech so that words are not readily pronounced or the sounds given in the proper order because of inhibition of action in certain centres. If, however, a stammerer becomes embarrassed, this temporary condition of nervousness may lead to spasmodic activity of the centres and consequent stuttering which may become a habit, though there is no real chorea.


There are three principal groups of muscles concerned in speech: (1) the muscles of breathing which control the flow of air, (2) the muscles of phonation that control the vocal cords, and (3) the muscles of articulation which are concerned in moulding the sounds in the mouth. Correct pronunciation requires not only that all of these muscles shall act perfectly, but that the different groups shall act harmoniously and in the right order. Stuttering and stammering are caused by lack of proper harmony as to amount, time, or order of contraction of the different groups of muscles, while ordinary defects in pronunciation are usually due to an improper use of the muscles of articulation which mould the sounds in the mouth. Stuttering and stammering, therefore, call first for training in breathing, then in phonation, and then in these processes combined with articulation, rather than training in articulation alone.

A habitual stutterer or stammerer should not continue in school, because the embarrassment of trying to

recite is likely to increase the difficulty, and his presence in the school may develop, by imitation and suggestion, a similar defect in other children who have the slightest tendency in that direction. A specialist, rather than an ordinary teacher, is needed to deal with such defects when they have become habitual. Incipient cases may, however, often be prevented from developing by the wise teacher, though perhaps not without individual work with the child when other pupils are not present. Some drill in breathing and phonation is often needed; but the principal thing is to free the child from the embarrassment of trying to say what he cannot, and to inspire him with confidence in his ability to speak. Sometimes concert drills in breathing, phonation, and articulation, alternating with the same exercise by designated individuals, will be of advantage to the whole school and at the same time completely cure the incipient stammerer or stutterer.

ADENOID GROWTHS

All children who frequently or habitually breathe through the mouth are likely to be found, upon examination, to be suffering from adenoid growth in the mouth or nose. If the child is also subject to frequent colds, and shows defects of pronunciation and of hearing, and if he appears mentally dull or slow most of the time, adenoids are almost surely present. These growths are apt to fill with blood and enlarge when the child takes cold. The mouth breathing, deafness, and mental dullness then increase because of the obstruction and the pressure on the nerves. In the less severe cases these phenomena appear *only* when the child has a cold,



while in more severe and long-continued cases they are chronic, and often result in catarrh and lung complaint. Inquiry will often show that such children snore at night, sleep with the mouth open, and have difficulty in breathing.

The growths are readily removed by a surgeon, and if they have not been present long enough to produce more than local and functional disorder, recovery usually occurs within a week or two. They rarely return. A complete change in disposition and mental ability, as well as in appearance and hearing, sometimes results within a few weeks, and cases are known of children who had required several years for a grade, making several grades in the first year after the operation. Teachers of children who breathe through the mouth should always advise parents to consult a competent physician.

DEFECTS IN HEARING


Various investigators who have tested large numbers of school children report from 13 to 30 per cent as defective in hearing in one or both ears. They also report that the greater portion of these defects, including some of the most serious, were unsuspected by the teacher. A large proportion of the children classed as peculiar or inattentive by the teacher, especially if they have a dull or heavy look, are usually found to be defective in hearing. In a few cases, the brightest and most attentive and alert pupils are found to be thus defective. Such children interpret gestures, movements of lips and eyes, expression of face, and the circumstances so readily, that their lack of hearing is not observed and may not

be discovered by special tests unless great care is exercised.

Children with less quick and active minds have the intellect dulled instead of sharpened by the defect. Sounds are less loud to them than to normal children, hence the sensory stimulus to attention is slighter, and there must be, therefore, either less attention on their part or more effort of attention than is required by a normal child. If they do not hear all that is said, they lose the connection between ideas and, as a consequence, lose interest, which is the necessary stimulus to attention. In subsequent lessons they not only labor under these disadvantages, but they lack the apperceptive knowledge given in previous lessons; hence it is not strange that they become habitually inattentive and apparently hopelessly dull. Even adults who are sitting so far back in a hall that they cannot hear all that a speaker says, or can hear only with effort, nearly always soon cease trying and become inattentive; hence it is not strange that children, who, through defective hearing, are in an analogous condition all the time, become inattentive, and either troublesome or apathetic.

The moral effects are often worst when children are defective in one ear only, or a part of the time only; for they are much more likely to be misunderstood by teachers and unjustly blamed for not paying attention or not doing as directed, since the teacher knows that they *have* done better, and thinks they *can* do better now if they will.

There are various causes of poor hearing, among which are adenoid growths, scarlet fever, and measles. When there is evidence of adenoid growths, the parents



should consult a physician; while the teacher, after a pupil has been out with scarlet fever or measles, should be careful to notice if there is impairment of hearing or sight.

DEFECTS OF SIGHT

The per cent of children with defective sight, especially in the higher grades, is much greater than with defective hearing, at least so far as the tests show. It is possible, however, to test the eye more accurately than the ear, and few eyes are absolutely perfect. It is common in this country to find from one-sixth to one-fifth of the children with eyes sufficiently defective to require attention.

The trouble with children's eyes is not usually due to loss of elasticity of the lens (though that sometimes happens to children who look at near objects a great deal), but to imperfect form of the eye. The most common defects are: (1) too great length from front to back of the eye; (2) too short a distance from front to back; (3) imperfect curvature of the eye. When the distance is too great, the rays from distant objects are brought to a focus in front of the retina, and consequently distant objects cannot be seen plainly. In other words, the owner of the eye is near-sighted, or myopic, and can see plainly only near objects. When the distance from the front of the eye to the retina is too short, the rays from all objects are brought to a focus behind the retina, and none of them, especially the nearer ones, can be seen plainly except by the action of the accommodating muscle that allows the lens to become more curved so as to refract the light more. It is often diffi-

cult for this muscle to produce enough accommodation to make near objects plainly visible. Such an eye is far-sighted (properly speaking, hypermetropic), and the owner needs convex glasses, or those that are thicker in the middle; while the one who is near-sighted needs concave glasses, or those that are thicker at the edges, to correct his defect.

When the front part of the ball of the eye is not perfectly round, but is curved or flattened more in one part than in another, some of the rays of light from an object will be brought to a focus on the retina and some will not; hence, some parts of the object will be plainly seen and other parts will not. Often the curvature of the eye is such that when it is accommodated for the middle portion and sides of the object, the top and the bottom will not be plainly seen, and when it is accommodated for the upper and lower parts, the sides are not clearly seen. No matter how much the person may strain his eye, he cannot see the whole of the object plainly at once, or else if the whole is seen, it is distorted, as you may have observed objects to be when seen through a defective window glass. This defect of the eye is called *astigmatism* and it may be corrected by wearing glasses that are curved where the eyeball is flattened, so that all the rays of light from an object passing through the glass and the eye are bent equally, and thus brought to a focus at the same point.

When the eyes are defective they are liable to become worse the more they are used, for the muscles of accommodation and the optic nerve are subjected to an unusual strain, and are likely to be weakened. The optic nerves are the largest in the body; hence, if they are

strained, the whole nervous system is frequently affected. Defective eyes are therefore the most common cause of nervousness and headache. In school the nervousness is frequently increased by inability to do the work properly, owing to poor sight, or because of fatigue caused by the effort to see clearly. It is important, therefore, that children should be observed and tested in school, and parents notified of serious defects in sight.

Exercises for Students

1. As a means of demonstrating a number of truths regarding fatigue, the following experiment should be tried and fully discussed. Place the hand on the table with the fingers and thumb touching it, then tap with the forefinger as rapidly as possible for three or four minutes. Make two such tests at different times: one in which the hand is not moved, and there is no variation in direction or height of movement, and no pause for rest; and another in which the hand may be moved, and the tapping varied at will. Notice the difference in feeling of weariness and difference in total number of taps made each time. *Variation* in rate of tapping may be determined objectively by having time called every ten seconds, while an observer for each tapper counts the number of taps made in each period. From these figures, individual fatigue curves may be constructed.

2. Illustrate from other experiences and observations any laws of fatigue not clearly brought out in the above experiment and discussion.

3. Specific instances of defects of the kinds named in the text should be observed and described if possible.

Suggestions for Reading

On the general subject of fatigue and conservation of mental energy, see Lombard, *Am. Jr. Psych.*, Vol. III, pp. 24-42; Dressler, *Ped. Sem.*, Vol. II, pp. 102-106; Hodge, *Am. Jr. Psych.*, Vol. II, pp. 376-402; S. W. Mitchell, *Wear and Tear*; Partridge,

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- On the fatigue of children, see *Report Com. Ed.*, 1894-1895, Vol. I, pp. 449-460; 1895-1896, Vol. II, pp. 1175-1198; O'Shea, *Pop. Sci. Mo.*, Vol. LI, pp. 648-662; Patrick, *Iowa Univ. Studies*, Vol. I, pp. 77-87; Barnes, *Studies*, Vol. I, pp. 163-170; Bellei, *Ed. Rev.*, Vol. XXV, pp. 364-386; Kratz, *N. E. A.*, 1899, pp. 1090-1096; Baker, *Ed. Rev.*, Vol. XV, pp. 34-39.
- On nervousness and other common defects of school children, see Warner, *The Study of Children*; Rowe, *The Physical Child*; Krohn, *Ch. S. Mo.*, Vol. IV, pp. 211-214; Sudduth, *Ch. S. Mo.*, Vol. III, pp. 540-543; Talbot, *Trans. Ill. Ch. S. Soc.*, Vol. III, pp. 75-90; Wolfe, *N. W. Mo.*, Vol. VII, pp. 22, 69, 157, 161, 274; Royce, *Ed. Rev.*, Vol. VI, pp. 209-222, 322-331, 449-463; Meyer, *Trans. Ill. Ch. S. Soc.*, Vol. I, No. 1, pp. 48-58; Campbell, *Ch. S. Mo. and Jr. Adoles.*, May, 1901, pp. 433-440; Morey-Errant, *Ch. S. Mo. and Jr. Adoles.*, May, 1901, pp. 441-448; Zirkle, "Medical Inspection in Schools," *Univ. of Colo. Studies*, June, 1902, pp. 66.
- On stuttering and other language defects, see Hartwell, *N. E. A.*, 1893, pp. 739-749; Lukens, *N. W. Mo.*, Vol. VIII, pp. 39-44.
- On defective hearing, Chrisman, *Ped. Sem.*, Vol. II, pp. 397-441; Percy, *Ch. S. Mo.*, Vol. I, pp. 97-109; Krauskopf, *Jr. Ch. and Adoles.*, April, 1902, pp. 100-106; Macmillan, *N. E. A.*, 1901, pp. 880-888.
- On defective vision, Allport, *Ed. Rev.*, Vol. XIV, pp. 150-159; Whitcomb, *N. W. Mo.*, Vol. IX, p. 237; Wolfe, *N. W. Mo.*, Vol. VIII, pp. 35-39; and reports, such as those of Christopher and Smedley.

CHAPTER XVIII

CHILD STUDY APPLIED IN SCHOOLS

PURPOSE OF CHILD STUDY BY TEACHERS

It should be understood at the outset, that teachers cannot, and should not be expected to make investigations with the purpose of discovering new truths for the science of psychology and child study. It is true that a teacher may, and sometimes should, coöperate with a specialist in gathering data for scientific purposes. She may also profitably repeat the experiments of specialists, not for the purpose of making or verifying generalizations concerning all children, but to learn to what extent the children under her charge, with their peculiar hereditary tendencies and local environing conditions, conform to or vary from the usual type, and consequently to learn how far the general principles indicated by the specialist may profitably be applied to those particular children.

Such a study carefully made also gives a teacher a more intimate and a broader knowledge of child nature, and a much better comprehension and appreciation of the results of scientific investigations. The self-culture thus obtained might of itself be sufficient justification for making such a study if the test is also a good exercise for the children. Especially is this true of those who are preparing to teach. The *primary purpose* of

a teacher, however, in studying children, whether as a school or individually, should not be to promote the science or her own self-culture, but to get facts that will aid in the culture and training of the children under her charge.

STUDYING AND MANAGING A SCHOOL AS A WHOLE

A teacher may in an *indirect* way make a valuable study of a school before she sees it. Knowing the grade she is to teach, she can infer the *age* of the majority of the children. From her knowledge of the principles of child study, she will know what characteristics are likely to be prominent at that age. This will give her some idea of the school, wherever it is located. The next step will be to study about the children and their surroundings.

If the children are nearly all of one or two *nationalities*, this will tell her something about them. Physical and social heredity will inevitably endow them with the principal characteristics of the nation to which they belong. Any knowledge, therefore, the teacher may acquire of these nationalities will be helpful to her in understanding the children.

A knowledge of the *occupations*, *social organizations*, and *amusements* of the people of the school district will also be helpful. The imitative instinct makes it absolutely certain that the children will take into themselves many phases of the social life by which they are surrounded. It is almost equally sure that the children will know much of the objects of nature and art by which they are surrounded, and little of those of other places unless they have travelled. The fundamental


apperceptive knowledge possessed by the children may therefore be determined by studying their natural as well as their social surroundings.

To know something of the *school knowledge* and training possessed by the children, the course of study and methods of teaching in the city or district may be studied. With some allowances for forgetting, pretty shrewd guesses as to what the children will know can then be made.

The *schoolroom*, with all its possibilities for heating, lighting, ventilating, seating, illustrating, and decorating, should be studied as an important factor in determining what may be done with the school that is to inhabit it. Books and apparatus should also be considered in this connection.

When the children appear and begin their work, the teacher may study them in a *direct* way by tests and observations, and thus supplement and perfect her previous conclusions. The majority of the children may prove to be either young or old for their grade, and their development may be greater or less than that usual for their ages, though the teacher's knowledge of their social surroundings should have prepared her for such variations as the latter. Their knowledge of natural surroundings and of school studies, when tested by reviews and questions, may also prove greater or less than was anticipated.

While studying the characteristics of the school to determine what kind of *regulations* to make, the teacher should notice how the children are affected by various forms of praise, reproof, or suggestion, in order that she may know how to best carry out these regulations. In



the case of a young teacher it will usually be safer at first to be a little too strict rather than too lenient.

She should not only observe the children during school hours, but seek to know how they spend their *time when not in school*, especially what they do in the way of work, play, or reading. Language exercises calling for information along these lines may be made very interesting to the children and valuable to the teacher who wishes her teaching to correct and supplement the incidental education given by the community. Such topics as the following, assigned at not too frequent intervals, will give the teacher a good idea of the activities and influences affecting the children when not in school. "What I like best to read, and why," "What I did last Saturday" (written on Monday), "What I did during vacation" (written just after vacation), "What I am going to do this vacation" (just before vacation), "What I do on school days outside of school hours," "The games that I like to play best, and why," "The best time I ever had," "What I am going to do when grown, and why," "Five things that are bad and wrong, and why," "Five things that are good and right, and why," "Some good acts and some bad acts that I have seen this week," "My experience in getting, keeping, and spending money," "What I would do with it if I received fifty cents a day for a month," "Which I would rather have, five dollars to-day, fifty dollars a year from to-day, or five hundred dollars in ten years, and why," "The kind of a playmate or chum I like best," "Pets that I have had and that I wish to have."

When a teacher first begins her work in a school, the children are slow in understanding her questions and

directions, and it is generally recognized that it takes time for teacher and pupils to get used to each other. This "getting used to each other" means not merely greater familiarity, but the formation of *habits* by the pupils, in accordance with the teacher's habits of doing things and of expecting them to be done. Many of these are very obvious, such as signals for leaving the room, asking questions, position assumed in reading, writing, and putting away or getting books and material, answering questions, etc., and it probably is well for the teacher to consciously direct the formation of such of these formal school habits as she thinks necessary, in order that they may be quickly established and require little subsequent attention. Direction in forming these habits should consist not so much in description of the thing to be done as of practice in doing it at the proper time.

The pupils' modes of observing and thinking will be affected by the way in which she questions, analyzes, and outlines, their feelings and sentiments influenced by those she holds and expresses consciously and unconsciously, and their attentiveness, carefulness, and persistency, by her example and her requirements. Every teacher should note the habits of thinking, feeling, and working, common to the school, that have been formed by the social environment and by previous school experiences and conditions, and should consciously strive to correct the undesirable ones and develop the good ones.

In attempting to break habits already formed, the teacher should remember that a habit is a tendency to do a certain thing *under certain conditions*, and hence that

a change in the conditions giving rise to a habit will often change the habit. It is also much easier to learn to do something else under the conditions calling forth a habit than to refrain from doing anything, or, in other words, it is easier to change a habit than to break it. It is therefore often wisest to say nothing about undesirable habits, but to change the conditions under which they are performed, or to set the children to doing something that will ere long take the place of the undesirable habit. For example, children who are led to become interested in hearing or doing something do not need to be told not to gaze around the room or out of doors; and those who are learning to observe or care for animals, will not long continue to practise cruelty toward them.

A teacher should be careful that the children do not get into the habit of holding her, instead of themselves, responsible for order. Very often they wait for a look or a word that has become a customary signal for them as individuals to do certain things. They are like a little three-year-old girl, who, after being reminded many times to stop before drinking her milk all up, said, when not so reminded, "Mamma, why don't you tell me to stop?"

In directing the formation of habits in which improvement with practice is desired, as in learning to write and draw, the teacher should be satisfied with the work as long as it shows improvement, but should be very careful when improvement stops, because one of two undesirable results is likely to appear; either the habit with its imperfect execution becomes fixed by repetition, so that after a time it is almost impossible to change

it; or else when the volitional effort to do good work decreases, the execution begins to revert back to a less developed stage at which it may then become fixed. It should also be remembered that doing a thing well under one set of conditions does not necessarily mean that it will be done equally well under others; hence a pupil who writes well when writing in a copy book, may write very poorly when trying to express his ideas in a language lesson. The teacher should, therefore, see that habits are perfected under the conditions likely to exist when they are to be used.

After a teacher becomes quite familiar with her school, she still needs to study it to know what to do in *special circumstances*. She must be quick to discover signs of nervousness, restlessness, fatigue, or loss of interest; thorough in searching for the causes, whether they be in the physical conditions of the room or in something that has been done either in or out of school; and fertile in expedients for removing or counter-acting undesirable influences.

If the cause of the difficulty should be in *herself*, she should be no less persistent in removing it. It is more important to the school that the teacher shall keep herself in good health and free from fatigue, nervousness, and worry than it is that she shall correct papers or even teach in the best possible manner.

If she is careless and unsystematic in her work, no amount of talking about neatness and order will make the children careful and orderly. If she calls, in a loud and irritated manner, for them to be quiet, she is really giving them a suggestion to become more noisy. If she is afraid the children will not obey her, the idea of dis-

obeying is at once suggested to them by her voice and manner. Since natural signs have greater suggestive force for children than words, it is not strange that they are more influenced by the actions, manner, and tone of voice of the teacher than by what she says.

The effects upon the school of suggestion and imitation among the pupils themselves are also frequently very marked.

The teacher should, therefore, study closely the *social* relations of her pupils, observing who seem to be leaders in the public sentiment of the school, and who are merely imitators and followers, then she should make a special effort to understand the leaders so as to influence them, and in that way to direct the sentiment and actions of the school. She should arrange the seating of pupils also, so that there will be as little temptation as possible to visiting or other disturbance. All cases of chumming and rivalry in individuals or of groups should be noted. In many schools it will be found that there are one or more societies formed by the children themselves, which not infrequently have special badges or passwords, and sometimes an extensive secret language. The teacher will find it interesting and profitable to become familiar with all these social relations of the little society of which she is the leader, and to note how the children are being influenced by them. She should seek to use, rather than to suppress, such social activities. Individual rivalries may not be ignored, but should not be encouraged; while rivalry between groups may be profitably encouraged when it leads to better coöperation of the members of each group, and is good-natured.

STUDY AND TREATMENT OF INDIVIDUAL CHILDREN

After the teacher has become so well acquainted with her school that she knows how to regulate it, and conduct the classes to the best advantage of the majority of the children, she should seek to know more of the exceptional and peculiar children whose needs are not being fully met, and to find ways of meeting their needs without interfering with the general school and class work. In doing this, she should never assent for one moment to the idea that all the children must be treated exactly alike. Everything she does should be for the good of each child, whether it be the assignment of a long or a short lesson, or the giving of a punishment or a reward. What will be the best training or the most effective corrective for one may not be for another; hence it is her duty to treat each pupil in the way that will cause him to improve most.

In her study of the school as a whole, the teacher will have noticed children who show marked variations from the average in many ways. There are undoubtedly *causes* for each peculiarity, and the teacher should at once seek to discover them. She should inquire into the past history and present conditions and surroundings to discover how far the child's peculiarities may be accounted for by heredity, sickness, accidents, previous school training, special home conditions, life outside of school, or present defects. Where the peculiarities are undesirable, their causes should be removed or counteracted as far as possible. Where they are in the nature of special interests or powers, the teacher should favor their development so far as may be without interfering

with the development of other phases of the child's nature.

Much ingenuity is required to keep all the members of an average class interested and actively employed all of the time, because of difference in rate and accuracy of working; yet, if this is not done successfully, some children are confused, others waste their time, and disorder is almost sure to appear.

When, in addition to what may be called, for want of a better term, "average pupils," the teacher has many who are peculiar, defective, abnormal, or exceptional in some way, her difficulties are greatly increased. In almost every school there are children who can get little or nothing from the regular class work. Teachers, with the large number of pupils they usually have, cannot possibly meet fully the needs of such children without sacrificing the rest of the school.

It is therefore desirable that, in every city, *ungraded rooms* for individual instruction should be provided. About one room in every ten should be of this kind. Two types of ungraded schools are desirable: one for primary children, who are so defective or peculiar that they cannot get started to learning readily in an ordinary class; and one for grammar-grade children who are exceptional, principally in their rate of working or knowledge of special subjects, and who, therefore, need special training in one or more lines in order to be fitted for the next grade. With such provision many peculiar and backward children soon show themselves capable of great improvement, and children who have in some way got behind in one or more subjects are enabled to pass from grade to grade without unnecessary loss of time.

Where such schools are not provided, some children are sure to suffer, and some of the best teachers to worry, because of the impossibility of meeting both class and individual needs.

OUTLINES FOR OBSERVATION

Countless outlines and directions for the study of children may be made, and have been made. Though many are so complete as to be cumbersome, none of them are exactly suited to indicate the special peculiarity of *every* child. Minute analysis of the characteristics of individuals is interesting to a certain extent, and has some value as training for the teacher, but she gains little from frequent attempts to analyze minutely the characteristics of all her pupils. Usually, she has only a few exceptional pupils that need much special study and treatment. Except in the case of a few pupils, who are all-round puzzles, the teacher generally needs to study only the causes and effects of one or two fundamental peculiarities as a means of knowing what to do for a child. The significance of any peculiarity depends not so much upon its prominence, as compared with that characteristic in other children, as upon its prominence as compared with other qualities possessed by the same individual. Even exact physical data, such as the lung capacity of a ten-year-old boy, have no significance until you know whether the boy is large or small for his age. The teacher, therefore, needs to compare the child's characteristics with the others that he possesses to determine their harmony and unity rather than simply to compare them with those of his companions.

The outlines given below are not intended to be in any way complete, but merely to be suggestive of what is likely to be most significant regarding a school, recitation, or individual.

The following questions prepared for normal students about to enter the practice schools are good ones for any teacher to ask soon after taking charge of a new school.

I. OUTLINE FOR THE STUDY OF A NEW SCHOOL

1. Should there be any change in the light or ventilation of the room, or in the seats of the pupils? What portions of the black-board are clearly visible from the different parts of the room?

2. Is the school as a whole about the average for schools of this grade in age, size, ability, and advancement?

3. Are there any pupils who are much behind or ahead in any of these respects, and if so, what explanation of such variations can you give?

4. Are there any pupils who show signs of poor health, nervousness, defects of eye and ear, and if so, what are the signs you have noticed? What can the teacher do for such pupils?

5. What do you notice in the habits and disposition of the school as a whole that is good, and what that needs improvement? What improvement do you expect to try to make?

6. Answer the same question as in 5 for individual children who have habits and dispositions different from the rest of the school.

7. What subjects are the pupils most interested in and what least?

8. The same questions as in 7 for individual pupils differing from the rest.

9. Make a special study of any child who seems to be a leader of a part or all the school, trying to determine how he leads his companions, and how he can best be led by the teacher.

The following outlines are intended to be used by normal students who are preparing to teach, but more experienced teachers may find them of some value.

II. SUGGESTIONS FOR OBSERVING INDIVIDUAL PUPILS

In getting acquainted with children it will be of advantage to note facts and form judgments in regard to the following points so far as you have opportunity to do so.

1. *Physical Characteristics.*

Size of child for his age.

Health.

Evidence of, or freedom from, nervousness.

Characteristics of attitudes and movements.

Condition of eyes and ears.

2. *School Work.*

Work as compared with the average of his class.

Success in different subjects.

Chief merits or defects as a pupil.

3. *Life outside of School.*

Character of his home.

Occupations outside of school in the way of studying, reading, working, or playing.

Characteristics shown outside of school different from those in school.

4. *Mental Characteristics.*

Ability, quickness, and accuracy in perceiving, imaging, remembering, and reasoning.

Emotional characteristics as manifested in fear, anger, jealousy, bashfulness, pride, and interests.

Effect of praise and blame.

Character of *attention*, reflex or voluntary, continuous or intermittent, intense or slight.

Actions, impulsive or deliberate.

Persistency or lack of it in working. How best appealed to.

What is needed most, stimulation, repression, or direction?

Evidence of his tendency to lead or to follow and imitate.

III. SUGGESTIONS FOR OBSERVING A RECITATION

Is the lesson (*a*) a review and drill lesson, or (*b*) the presentation of new truths?

If (*a*), is the chief aim to fix in memory or to gain speed and accuracy in what is already known?

Does the teacher rely upon many repetitions for her results, or does she depend more upon intensity of interest?

To what extent does interest and success depend upon the rate of working, devices used, and variety introduced into the drill?

Are all the children kept busy all the time during the lesson?

If (*b*), what is the aim of the lesson?

1. *Subject-matter.*

What is given the children? What can you say as to the amount and arrangement of this subject-matter and its connection with preceding lessons and those that are to follow?

2. *The Teaching.*

Is the subject-matter presented by means of objects, representations of objects (pictures, diagrams, models, maps), or by means of words (printed or oral), or by a combination of two or more of these?

Notice what means (questioning or other) the teacher uses to connect truths taught with each other and to lead to general conclusions and their applications.

3. *The Class.*

Are they attentive and interested?

What in subject-matter or mode of representation is or is not suited to the age, knowledge, and ability of the children?

What mental powers are they using principally, perceptive, representative, or thinking?

What kinds of apperceptive knowledge are they recalling:

(1) previous knowledge of the same or other subjects studied, or (2) knowledge gotten outside of school by hearsay, observation, and experience? To what extent do they relate the old knowledge to the new, with or without suggestion?

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Notice if correct general conclusions are reached, and if they are applied to particular cases correctly.

What habits of the class do you notice?

4. *Individual Children.*

Report all individual peculiarities that you note during the recitation.

A good way of promoting child study among teachers is to call for reports regarding all pupils having a certain characteristic in a marked degree; as, quick temper, perseverance, poor sight, restlessness; or regarding those who are good in reading or spelling or arithmetic, or those remarkable for size, quickness, or lack of energy. Let each teacher describe one or two of her pupils who have in a marked degree the characteristic selected, telling how they are in other respects, and what she finds to be the best mode of dealing with them. Such comparison and discussion of similar experiences will be very helpful and lead to further observations.

REPORTS, TESTS, AND RECORDS

There has unquestionably been much vexation of spirit and waste of time in making child-study reports, as well as in the reports required by the old-time marking system. Such reports, therefore, should be as brief and from the standpoint of the teacher as significant as possible. One like the following may be made two or three times a year with profit to all concerned.

Name of pupil — Grade — Sex — Date of Birth —.
Particularly good or poor in what subjects, if any.
Character of conduct.

Remarks regarding characteristics important to recognize in dealing with the child (as sensitiveness, stubbornness, slowness, lack of persistence, special interests, special physical or home conditions, etc.).

Evidence of a change for better or worse in work or conduct.

Date — Teacher —

Children are so variable in their conduct, and show forth such different characteristics to different persons, that often reports are of little *permanent* value. The best pupil under one teacher may be the worst under another teacher, and the child least interesting to his teacher at the beginning of the year may be the most attractive at the close.

The same actions may also be interpreted by one teacher as shyness and by another as stubbornness, or as sensitiveness by one and as lack of feeling by another. For these reasons it is often better for a teacher to get acquainted with her pupils before she reads the reports another teacher has made regarding them.

With data obtained by tests, and from inquiry regarding the home life and past history of the child, the case is different. Such facts if not more reliable, are at least more permanently significant. The number of such facts that *may be* of value is almost infinite, but the number that it will be found practicable to obtain and keep on record, is very limited in most schools, where so many other things demand the immediate attention of teachers and superintendent. The admission *card* should state at least these facts: date of birth, residence, nationality of parents, occupation of father, and the last school attended. The most important *tests* to

be made and kept on file are those of hearing and sight. If it is not practicable to have all the children tested, teachers should themselves closely observe all signs of defects in hearing and sight, and test pupils who show any signs whatever of such defects.

Defects of hearing are to be found in every schoolroom. Any pupil who is habitually inattentive or apparently careless, or who watches a teacher's mouth very closely when speaking, or who looks to see what other pupils are doing before beginning to follow directions, should be observed, and, if necessary, tested, to discover whether his hearing is defective. The teacher should notice if it makes any difference whether she stands close in front of, behind, or on the right or left of the child when she speaks to him, and whether he shows that he hears when there is no possible chance for him to guess what is said.

The detection of poor hearing is difficult for (1) the defect may be in one ear only, (2) may be greater at some times than at others, especially when the child has a cold, (3) if the attention is first secured, hearing is often surprisingly improved, (4) nearly all children with poor hearing have learned to make shrewd guesses at what is being said. (5) Few buildings are sufficiently quiet for accurate tests to be made.

In all doubtful cases, at least, the teacher should test the children with the watch or other convenient means. Several persons should be tested with the watch to find out how far it can be heard by normal ears, for watches vary greatly in loudness. The child should look straight ahead and hold a card against his face so as to conceal from his view the movements of the one testing him.

Often a child thinks he hears a watch when he does not, hence it may be necessary to occasionally cover it tightly with the hands in such a way as to muffle the sound, in order to determine positively whether or not the child hears. If the distance in a quiet room at which a child can hear a watch is less than three feet, his hearing is almost surely defective, and it may be if the distance is greater.

When a child is known to have poor hearing nothing should be said about it, but he should be placed in as favorable a position as possible for hearing what the teacher and also his classmates say, and the teacher should take special pains to see that he does hear all directions that he is expected to follow. Children with defective hearing frequently form habits of inattention, and sometimes, when they are aware of their deficiency, try to excuse themselves for failure to do things they have been told to do, on the ground that they did not understand. The teacher should take the greatest pains to make this excuse an impossible one, and to break up habits of inattention. Under no circumstances should the teacher assume that the child heard, or could have heard if he had tried, and blame him for not doing so; but she should have tested him thoroughly so that she *knows*, both from the conditions and from his expression of face or oral acknowledgment that he has heard, and then she should hold him responsible for remembering and doing what he is told. To manage a child with poor hearing without either doing him an injustice, or "babying" and unwisely excusing him for non-performance or imperfect performance of tasks, often requires great tact and wisdom.

Defects of the *eye* are more common, but somewhat less subject to serious misunderstanding than those of the ear. Pupils who hold books in unusual positions, who wink or rub their eyes a good deal, who frequently fail to do perfectly work placed on the board, or whose eyes look red, weak, or tired, or who have frequent headaches, or who wrinkle the brows, or show other signs of nervousness, should be tested.

One of the best cards for testing, and the only kind that can be successfully used with first-grade children, is one in which it is not necessary to name the letters, but merely to tell which way a series of E's of different sizes point. In order that there may be no misunderstanding, it will be well, with small children, to first test them close enough to the card to be sure that they know which way the letters point, and how to indicate the direction of the letters by pointing or by words. The child should then be placed with his back to a window, holding a stiff card over (not against) one eye, and asked to tell which way the letters, indicated with a pencil, point. The distance should be that for the smallest or next to the smallest letters on the card, and, of course, the largest letters should be pointed to first. In pointing it is well to hold the pencil vertically under the letter, that the letter may not be partly covered, or shadowed, by the pencil, and that there may be no doubt as to which one is meant. The record of the test is made by taking the distance at which the card is held as the numerator, and the number of the last line of letters read as the denominator of the fraction. Thus, if the distance is 5 metres, and the number of the line last read is 10, the record will be $\frac{5}{10}$.

This means that the child can read at 5 metres what a normal child can read at 10 metres.

The above test will usually, though not always, be sufficient to detect serious defects of vision, but in doubtful cases should be supplemented by tests for near vision and for astigmatism. As soon as a teacher is fully convinced that a pupil's eyes are seriously defective, she should advise the parents to have them examined by a specialist. In the meantime, she should place the child where he will have the best conditions possible for seeing.

If physical and mental *measurements* and *tests* are practicable in a school, the following ones, carefully selected for use in the Model and Practice Schools of the Fitchburg Normal School, will be found significant and helpful. The measurements are made and the vital capacity calculated according to tables and directions given in Hastings's Manual for Physical Measurements, the tests of memory according to the methods used in the Child Study Laboratory of the Chicago Public Schools, and the tests of sight and hearing according to the directions given above. The "rate of movement" is really an elementary test of both physical and mental ability in which pupils make marks in squares as rapidly as possible, putting one, two, or three marks in each square, in accordance with the figure at the top of each square. The time required for making the hundred marks is recorded in seconds.

In the first column are placed numerical records of the tests, and in the second, letters, indicating the rank of the child as compared with the average.

FRONT OF CARD

Name

Date of birth: Yr. Mo. Day

Dates of Tests								
	Test	Rank	Test	Rank	Test	Rank	Test	Rank
Weight								
Height standing								
Height sitting								
Breadth of head								
Breadth of chest								
Breadth of waist								
Girth of head								
Depth of chest								
Chest expansion								
Lung capacity								
Vital capacity								
Grip, right hand								
Grip, left hand								
Rate of movement								
Memory, auditory								
Memory, visual								
Vision acuteness, R.								
Vision acuteness, L.								
Astigmatism ?								
Hearing, R.								
Hearing, L.								

Note : m.=medium, h.=high, v. h.=very high, l.=low, v. l.=very low.

BACK OF CARD

TO PARENTS:—

Body and mind are closely related. Teachers may be aided in dealing with children by information regarding the health of their pupils and what they do outside of school. We therefore ask you to kindly underscore the diseases to which your child is subject, and the occupations in which he is much engaged outside of school and to add any other facts that may be helpful.

DISEASES: Biliousness, constipation, indigestion, headache, sleeplessness, nervousness, heart, lung, or throat troubles.

OCCUPATIONS: Outdoor work, indoor work, indoor gymnastics, outdoor plays and sports, indoor games, reading, studying, music practice.

Remarks:

Signed

Suggestions for Reading

The books of most general value on the subject of studying children in school are those of Warner, Rowe, Hastings, and Groszmann, and the reports of Christopher and Smedley to the Chicago Board of Education, while various educational journals and reports of child-study societies, especially of Illinois and Minnesota, contain numerous outlines and suggestions, and also some reports of school superintendents such as Spaulding of Passaic, N.J.

On the school conditions, works on school hygiene, such as Kotelmann, Shaw, or Burrage and Bailey, should be consulted if necessary, and also the following articles: Mosher, "Habitual Postures of School Children," *Ed. Rev.*, Vol. IV. pp. 339-349; McKenzie, *N. E. A.*, 1898, pp. 939-948; Parnell, "Medical Inspection in School," *N. E. A.*, 1898, pp. 454-462; Lemon, "Psychic Effect of the Weather," *Am. Jr. Psych.*, Vol. VI, pp. 277-279; Dexter, *Ped. Sem.*, Vol. V. pp. 512-522, *Ed. Rev.*, Vol. XIX, pp. 160-168; or Monograph Suppl., *Psych. Rev.*, No. 6.

On children's movements, the studies of Curtis, *Ped. Sem.* Vol. VI, pp. 90-106, and Lindley, *Am. Jr. Psych.*, Vol. VII, pp. 491-517, while various tests are described by Seashore, *Ed. Rev.*, Vol. XXII, pp. 69-82, and Hancock, *Ped. Sem.*, Vol. VIII, pp. 291-340.

- On the practical value of child study in school and the relations of teacher, pupils, and the home, see Luckey, *Ch. S. Mo.*, Vol. I, pp. 230-247; *Educ.*, Vol. IV, pp. 271-275; *Ed. Rev.*, Vol. XIV, pp. 340-347; Van Liew, *N. E. A.*, 1896, pp. 864-872, 1897, pp. 294-296; Galbreath, Jr. *Ped.*, Vol. XI, pp. 153-170; Patrick, *N. E. A.*, 1895, pp. 906-914; Whitney, *Educ.*, Vol. XV, pp. 466-473; Thayer, *Educ.*, Vol. XIV, pp. 68-75, 142-148; Kratz, *Ped. Sem.*, Vol. III, pp. 413-418; Bell, *Ped. Sem.*, Vol. VII, pp. 492-525; Baker, *Educ.*, Vol. XIV, pp. 264-268; Skinner, *Trans. Ill. Ch. S. Soc.*, Vol. II, No. 2, pp. 28-39; Russell, *Ped. Sem.*, Vol. II, pp. 343-357.
- On child study in the kindergarten, see Payne, *N. E. A.*, 1897, pp. 586-593; Mackenzie, *N. E. A.*, 1893, pp. 285-292; Nicholson, *Ch. S. Mo.*, Vol. II, pp. 675-684; Bailey, *N. E. A.*, 1899, pp. 541-546.
- On child study in secondary schools, see Atkinson, *School Review*, Vol. V, pp. 243-284, 461-466; Scudder, *School Review*, Vol. VII, pp. 197-214; Austin, *N. W. Mo.*, Vol. VIII, pp. 487-490.
- On the graded system and individual instruction, see F. Burke, *N. W. Mo.*, Vol. VIII, pp. 481-484; C. Frear Burk, *Ed. Rev.*, Vol. XIX, pp. 296-302; Powell, *Ch. S. Mo.*, Vol. I, pp. 290-305; Search, *Ed. Rev.*, Vol. VII, pp. 154-170; Barnard, *N. E. A.*, 1899, pp. 163-170; Kennedy, *N. E. A.*, 1901, pp. 295-300, and the *N. E. A.* discussion, 1898, pp. 422-448.
- On secretiveness of children, read C. Frear Burk, *Ch. S. Mo.*, Vol. V, p. 355, and for interesting individual studies, see Russell, *Ed. Rev.*, Vol. VI, pp. 431-442; Stableton, *Diary of a Western Schoolmaster*, and *Ch. S. Mo.*, Vol. IV, pp. 451-448. See also Triplett on "Faults of Children," *Ped. Sem.*, Vol. X, pp. 200-238.



ALPHABETICAL LIST OF BOOKS NAMED IN THE SUGGESTIONS FOR READING

- Adler, Felix.** Moral Instruction of Children. Appleton, 1895, pp. 270.
- Aiken, Catherine.** Methods of Mind Training. Harpers, 1899, pp. 122.
- Baldwin, J. M.** Mental Development. Vol. I, Methods and Processes, pp. 488; Vol. II, Social and Ethical Interpretations, pp. 514.
- Blow, Susan.** Symbolic Education. Appleton, 1894, pp. 251.
- Bradford, A. H.** Heredity and Education. Ed. Rev., Vol. I, pp. 147-159.
- Brooks, W. K.** Heredity. Baltimore, 1883. The Foundations of Zoölogy. Macmillan, New York and London, 1899, pp. viii and 339.
- Brown, E. E.** Notes on Children's Drawings. University of California Studies, 1897, pp. 75.
- Buck, Winifred.** Boys' Self-Governing Clubs. Macmillan, 1903, pp. 218.
- Burrage and Bailey.** School Sanitation and Decoration. D. C. Heath & Co., 1899, pp. 191.
- Butler, N. M.** Meaning of Education. Macmillan, 1898, pp. 230.
- Call, Annie Payson.** Power Through Repose. Little, Brown & Co., 1902, pp. 201.
- Chadbourne, P. A.** Instinct, pp. 323. Putnams, 1883.
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